INSIDE: PREDICTING SUMMER STREAM FLOW

Montana Outdoors

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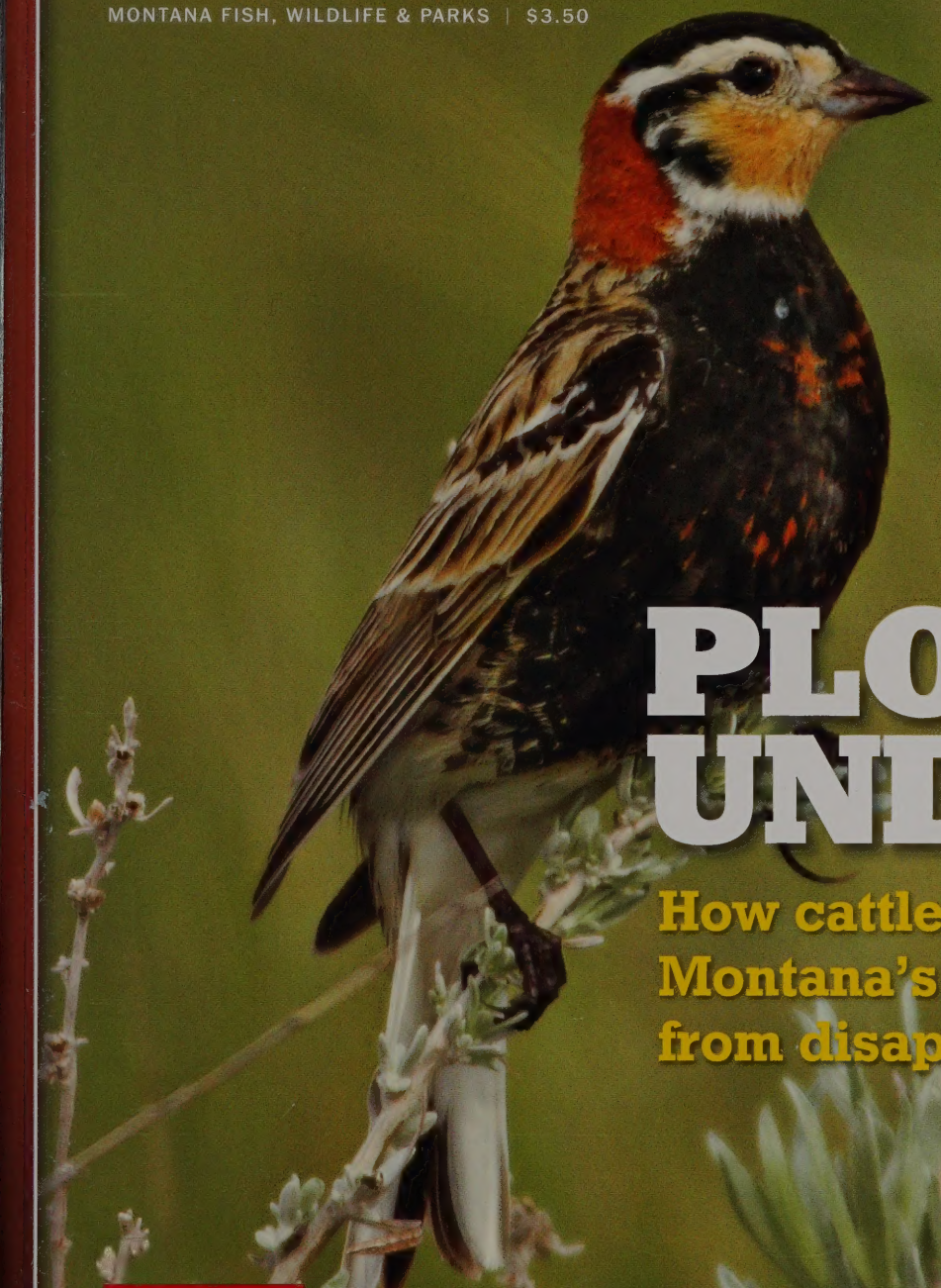
MARCH–APRIL 2016



PLOWED UNDER?

How cattle could prevent Montana's prairie songbirds from disappearing

IN THIS ISSUE:

THE MATING GAME

ROADKILL REVISITED

A GUN SHOW NOVICE

KEEPING WORKING FORESTS WORKING

Montana Fish, Wildlife & Parks

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ARSENAL FOR SALE
Rifles line a table during a gun show at the Park County Fairgrounds in Livingston. See our story on gun shows on page 26. Photo by Erik Petersen.

FRONT COVER
Chestnut-collared longspurs like this one in Valley County prefer cows over plows. See why on page 34. Photo by John Carlson.

Montana Outdoors

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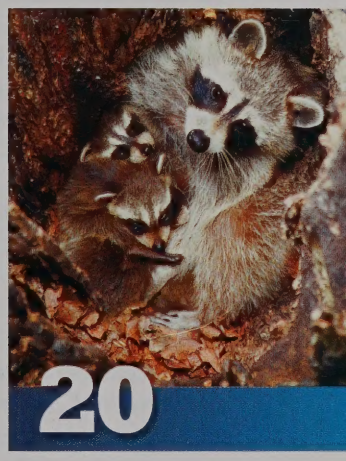

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SPOT-on suggestion

Regarding the recent article on getting lost in the woods ("Lost in Space," November-December), I'm surprised that you failed to mention the most high-tech tool currently available for search-and rescue scenarios. With a simple push of a button, devices like the SPOT satellite tracker can instantly deliver a lost person's GPS coordinates to local search-and-rescue agencies. A SPOT tracker is especially useful for those who venture out alone. Although the device has been bad-mouthed as a "Yuppie 911" toy, my guess is that a growing number of rescuers now firmly believe that the SPOT tracker is invaluable.

Steve Barrett
Kalispell

Before it's too late

Regarding your essay, "We Lucky Few" (September-October): Time has a habit of running out for some of us old boys when it comes to successfully drawing a sheep, moose, or mountain goat tag. Faced with the possibility of not drawing a permit before creaky joints or physical infirmity made such a hunt impossible, my friend Stan Swartz and I hatched a plan, enlisting the support of

state Senator Fred Thomas. Fred enthusiastically introduced our bill to the 2013 legislative session.

He submitted the following bill: Any person who has reached age 68 and has been a resident of Montana for at least 10 years, and has unsuccessfully applied for a tag for 20 consecutive years, would be placed into a pool. Eight sheep and eight goat tags would be set aside for qualifying individuals. Should there be fewer than eight applicants, each would be given a tag. If more than eight people applied, they would be put into a drawing. Though the Senate passed our bill, it was tabled by the House.

This past season, at age 74 and after applying for 40 seasons, Stan finally drew a sheep tag and got a nice ram after a two-hour belly crawl.

At age 72, having applied for three decades, I'm still hopeful. Perhaps Father Time will be kind.

Ed Wolff, DVM
Stevensville

Photo, not a rug

In your November-December issue, you tout "Trophy hunting's conservation contribution" and take issue with the negative publicity generated by the killing of Cecil the lion in Africa. Is FWP chomping at the bit to trophy hunt the majestic and relatively rare grizzly bear? Hunting plentiful elk, deer, or antelope to put meat on the table is a respected and honored tradition, but trophy hunting is something altogether different. There are numerous reasons why the grizzly bear should not be subjected to trophy hunting. Two of its primary food sources, whitebark pine seeds and cutthroat trout, have declined dramatically from their former abundance. Grizzlies pursue elk, which already exposes them to losing conflicts with hunters. At present the Greater Yellowstone Ecosystem (GYE) grizzly is "trapped" on an island with no successful corridor to connect with other populations. Development continues to encroach on their habitat. Evidence is mounting that the GYE grizzly population has leveled off, and may be on the decline. I would suggest that most Montanans would rather see and photograph a live grizzly than kill one for a rug.

Orville Bach
Bozeman

Technically true, but...

In your article "Danger Around Every Bend" (November-December), you write, "And there has never been a documented case of a person being killed by a healthy wolf in the lower 48." Technically that may be true, but to imply wolves pose no danger to humans is misleading. I'd simply like to suggest you read the well-documented book called *The Real Wolf*, by Ted B. Lyon and Will N. Graves.

L. Hinderager
Blackfoot, Idaho

Where's the rainbow?

No wonder I find it difficult to catch those elusive rainbow trout. I can't even catch a glimpse of one right there before my eyes in the photo on page 9 of your January-February photo issue. I've examined it daily for over a week. I only see reflections. Help!

Elvin Borg
Rochester, WA

Art director Luke Duran responds: I have marveled at the bright aquatic plant life in Giant Springs, watching as light casts reflections and shadows in the roiling current. After several minutes staring into this abstract, bubbling tapestry, the flick of a fish tail or a flash of scales reveals the rainbow trout that drift camouflaged among the plants and rocks.

At first, I too didn't see the trout in Steven Akre's photo, but after close examination and Photoshop zooming, I could see the outline of the trout, indicated here by the arrow. Perhaps other readers see more than one fish?

Corrections

The photograph on page 41 of the November-December 2015 issue is a long-tailed weasel, not a least weasel. The berries on page 18 of the January-February photo issue are serviceberries, not rose hips. The young buck on the inside front cover of that same issue is a white-tailed deer, not a mule deer.

Venison Stir Fry

By Tom Dickson | Preparation time: 20 minutes | Cooking time: 20 minutes | Serves 4

INGREDIENTS

- 3 T. vegetable oil
- 1 lb. venison roast or loin (or pheasant breast) sliced into ½-inch-wide strips
- 1 lb. combination of onions, carrots, red peppers (all sliced thin), and broccoli (stems trimmed and then cut into 1-inch chunks)
- 1 t. garlic (crushed or finely diced)
- 1 t. ginger root (peeled and finely diced)
- 2 c. bean sprouts

Sauce

- ¾ c. chicken broth
- ¼ c. soy sauce
- 2 t. Kikkoman sweet rice seasoning
- 2 t. sesame oil
- 1 t. red pepper flakes
- 1 t. sugar
- 3 t. cornstarch

DIRECTIONS

Make the sauce (combine all ingredients in a small bowl and whisk). Set aside.

In a wok, large skillet, or Dutch oven over medium-high heat, heat 1 T. oil and add half the meat. Cook for 2 minutes, then stir and turn all pieces to brown for another minute. Remove browned meat, add another 1 T. oil, and brown the second batch. Set meat aside.

Wipe moisture from skillet with a paper towel, heat remaining 1 T. oil, and add the onions, carrots, peppers, and broccoli. Cook at medium-high heat for 4 minutes, stirring occasionally.

Add garlic and ginger and cook for 1 minute. Add bean sprouts.

Stir the cooked meat into the vegetable mixture. Whisk sauce again and add to the meat and vegetable mixture. Stir until the mixture begins to bubble and thicken, about 2 minutes.

Remove from heat and serve over white rice. ■

As much as I love venison, a meal of just meat can be dull and nutritionally deficient. One way to combine venison with a healthy amount of tasty and colorful veggies is by making stir fry. Stir fry is an ancient Chinese method of quickly cooking meat and vegetables in a small amount of oil over high heat. This recipe is adapted from a popular *Cook's Illustrated* version.

I like a mix of onions, carrots, red peppers, broccoli, and bean sprouts for the color, texture, and taste, though you could use fewer vegetables. Don't be intimidated by the fresh ginger root. You can find it in many supermarkets. If you don't already have them, you'll need to buy a small bottle each of sweet rice seasoning (the Kikkoman brand is common) and sesame oil, both found in the Asian cooking section of grocery stores. They are worth the investment. Once you taste this delicious mix of venison and crisp, cooked vegetables, it's certain to become part of your monthly dinner rotation. (It also works well with pheasant breasts, beef, pork, and chicken breasts.)

—Tom Dickson is editor of Montana Outdoors.

RICE COOKERS

Because my wife and I consume a lot of rice, we long ago decided that a rice cooker was a smart purchase. Simply add rice and water, close the cover, and set a timer. When it dings, you have perfect rice. The most reliable brand is Zojirushi, a Japanese manufacturer. For most families, the 3-cup (uncooked) model is ideal.

SHUTTERSTOCK

Time to broaden our base

Having now spent 11 years as director of Montana Fish, Wildlife & Parks, the single biggest issue I see facing this department is the need for additional sustainable funding sources to help us manage Montana's remarkable bounty of fish and wildlife species and their habitats.

Over the past century, almost all the fish and wildlife conservation work done by FWP has been paid for by hunters and anglers. That funding comes from hunting and fishing license sales, as well as a federal excise tax on guns, ammo, rods, reels, and other sporting gear. With that money, FWP and its partners have restored elk, bighorn sheep, and pronghorn populations; helped protect streams and rivers; and created some of the nation's best hunting and fishing opportunities.

Watching birds along the Clark Fork River. Birders and others should have opportunities to contribute to fish and wildlife management.

Our focus has primarily been Montana's roughly 80 fish and wildlife game species—those that can be harvested. Yet our state is also home to another 550 species of fish, mammals, birds, amphibians, and reptiles. Many of these species require management too, for several reasons:

- It's FWP's responsibility to manage *all* fish and wildlife species, not just those pursued with rod, bow, or gun.
- We are legally required to manage federally threatened or endangered species like the bull trout, pallid sturgeon, grizzly bear, and Canada lynx.
- We need basic knowledge of species of concern like the Sprague's pipit in order to conserve them and keep them from becoming federally listed.
- A growing number of Montanans are asking that we pay attention to species like common loons, long-billed curlews, blue suckers, and flammulated owls.

For decades, many nongame wildlife species have benefited from work to conserve game species. Freezeout Lake Wildlife Management Area, for instance, provides habitat for two dozen shorebird species in addition to the multitudes of waterfowl that frequent that area. Work to protect trout streams provides homes and food for mink, muskrats, otters, kingfishers, and osprey.

Hunters and anglers have funded most of this work, as well as most management costs for gray wolves, grizzly bears, and other federally listed species. It's no longer feasible to expect them to shoulder so much of the burden. Hunter and angler numbers remain steady in Montana, but the need to manage additional species continues to grow. What's more, many people who don't hunt and fish benefit from license-funded conservation and services. Innertubers use fishing access sites for free, birders pay nothing to visit Freezeout Lake WMA, and tourists enjoy, at no charge, the grizzlies, elk, bighorn sheep, and clean rivers that Montana sportsmen and sportswomen helped restore and manage.

The good news is that many Montanans and tourists want to help pay for fish and wildlife conservation.

FWP and others in Montana's conservation community are looking for ways to make that happen. Over the past year, a diverse citizen's group called Finding Common Ground met to discuss the feasibility of broadening Montana's fish and wildlife conservation funding base. On a national level, the Blue Ribbon Panel on Sustaining America's Diverse Fish and Wildlife Resources is exploring federal funding options. The panel includes Bass Pro Shops founder John L. Morris, former Wyoming Governor Dave Freudenthal, and conservation interests like the Cornell Laboratory of Ornithology. The group may soon propose that Congress authorize using part of the money now going into the U.S. Treasury from federal offshore oil and gas leases to provide matching grants to states for more broad-based wildlife conservation. Under current proposals, Montana could receive up to $22 million per year. That would be great news, except that we'd still have to come up with matching state money, so we'll need a state source other than what hunters and anglers pay FWP.

> "We're simply, out of necessity, welcoming more participants—and payers—into the tent."

Striving to broaden our funding base in no way means we will do less for game species or abandon hunters and anglers. FWP strongly values and supports the longtime and continued importance of hunting and fishing to Montana's culture, economy, and conservation ethic.

We're not leaving anyone behind, especially "them that brought us here." We're simply, out of necessity, welcoming more conservation participants—and payers—into the tent. It's either that or watch our state fall further and further behind on our responsibilities to manage all the fish and wildlife that contribute to the Montana experience.

—**M. Jeff Hagener**, Montana Fish, Wildlife & Parks Director

CRAIG & LIZ LARCOM

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PAUL N. QUENEAU

HUNTER ED SUPPORTER

VIVACA CROWSER
Regional Information and Education Program Manager, Missoula

Every winter I hold a workshop for all our regional volunteer Hunter/Bowhunter Education instructors, as do the other six Regional Information and Education Program managers across Montana. In this photo I'm announcing awards for years of service, and I'm always glad that so many award recipients bring family members to see them get that recognition.

These events are the one time each year when all of us come together over lunch and talk about the past year, share stories, learn new things, and plan for the upcoming year. Sometimes I take a step back and am just amazed at the amount of work our instructors do, volunteering in the evenings and really committing themselves to teaching kids and adults about hunter and bowhunter safety and ethics. We provide them with the supplies and help with class scheduling, but they are the ones doing most of the work. I'm continually impressed how, year after year, the instructors not only stay involved in the Hunter/Bowhunter Education Program—in some cases for decades—but also continue working with us to keep improving it.

A few years ago, Helena photographer **KENTON ROWE** landed a *National Geographic* cover (Russian edition) with a shot of a Montana mountain lion and her cub that he photographed after learning of the den's whereabouts from a friend. The photo shown here came from another tip, this one from a friend who told him about a group of calypso orchids growing in Lewis and Clark National Forest just west of Helena. "Usually I see only one or two at a time, so to see this group of a dozen or so was really striking," says Rowe. "I lay flat on the ground and used a 10-22 mm lens to take in all the orchids as well as the dark conifers rising up in the background. What I like about this shot is that I was able to give the flowers the same sense of height and grandeur as the tall trees. Usually forest flower photographs are just close-ups of the flower, with no context, but here, because I was able to get down below the flowers, I could capture both the orchids and the entire forest environment they were growing in." ■

OUTDOORS REPORT

1

Number of area codes in Montana (compared to 26 in Texas and 31 in California)

Drumming up romance

It sounds like a miniature machine gun firing up on your roof: *rat-a-tat-tat-tat-tat-tat-tat*.

Is it a tiny Al Capone fighting off federal agents? Nope, just a Montana woodpecker back from its long winter migration.

In spring, both male and female woodpeckers rapidly tap their bill on metal or wood. The loud sound is meant to attract a mate. Though the birds historically "drummed" on hollow trees, they now get the sound from wood and aluminum siding, downspouts, gutters, chimney caps, and roof flashing. Woodpeckers (including flickers) don't damage property with their love taps, but the sound annoys homeowners. Drumming can start at dawn and last all day, sometimes for weeks. Often the birds are hidden underneath eaves or behind chimneys.

Noisy neighbor

To deter a woodpecker from drumming, try to spot where the bird is making the racket. A woodpecker drums on surfaces that resonate, so secure loose boards or use filler behind boards that sound hollow. Temporarily cover chimney caps or other metal with cloth, foam rubber, or insulation. The bird will likely leave and find a nearby house or other building with better acoustics.

OUTDOOR RECREATION

Nature nurtures, say scientists

No wonder so many of us feel refreshed and invigorated after a day of hunting, fishing, camping, or hiking. An article in the January 2016 issue of *National Geographic* ("This Is Your Brain on Nature") reports that scientists are quantifying nature's healing power. One study found that outdoors immersion can improve creativity by up to 50 percent, while another found that forest walks decrease a certain stress hormone by as much as 16 percent.

How? One reason, Stanford researchers discovered, is that nature doesn't demand the intense mental focus that modern life requires. This "involuntary attention," in which the mind attends to peaceful, natural features such as trees, clouds, and mountains, helps the brain disengage. That mental rest restores the brain's capacity for the "directed attention" required to work, solve complex problems, and live in the modern world. ■

Cycle Yellowstone now

We generally don't tout Yellowstone National Park, because most of it is in Wyoming. But here's a great late-winter park activity that begins and ends in Montana. From March 15, the day Yellowstone closes to over-snow traffic, to the third Thursday in April, a few roads plowed for administrative vehicles are also open for cycling, walking, jogging, and in-line skating. The roads run from the West Yellowstone entrance to Mammoth as conditions allow. (The road between Madison Junction and Old Faithful is closed for bear management.)

Giving wildlife wide berth in Yellowstone

Weather this time of year is a crapshoot—sunny skies, blizzards, rain, you name it. And there's usually a headwind on the return trip from Madison Junction to the West entrance (28 miles round-trip). Riders must pack in and pack out all food and other supplies. Park officials urge riders to travel single file, carry bear spray, and give wide berth to any wildlife (or even turn around if bison are blocking the road).

Get more information by calling Freeheel and Wheel, a West Yellowstone ski and cycling shop, at (406) 646-7744. ■

CLOCKWISE FROM TOP LEFT: CARTOON ILLUSTRATION BY MIKE MORAN; STEVEN GNAM; BARBARA TIMMS; SHUTTERSTOCK; SHUTTERSTOCK; NEAL HERBERT/NATIONAL PARK SERVICE; JANET PLANTE

WILDLIFE MANAGEMENT

Shoulder seasons popular with hunters

"The interest was phenomenal," says Gary Bertellotti, FWP regional supervisor in Great Falls. He is talking about the deluge of phone calls that FWP offices received during the ten-week pilot elk hunting shoulder seasons this past winter. "When the season opened, lines at our front desk in Great Falls were tied up for hours. And every week during the season, our White Sulphur Springs office got at least 500 calls a day," he says.

Bertellotti attributes the phone line free-for-all to strong interest by hunters in harvesting a cow elk. "Getting an elk is a big deal for hunters, and this shows just how much hunters want additional opportunities to hunt and harvest one," he says.

FWP estimates that 7,500 to 10,000 hunters from across Montana, and even other states, called to see if they could take part.

Shoulder seasons are an additional season before or after the regular five-week elk season for hunting districts with too many elk. The goal is to reduce populations where overabundant elk are knocking down fences and consuming haystacks and pasture meant for livestock.

"Pilot" shoulder seasons were conducted in five central Montana hunting districts this winter where elk overabundance is most severe. The pilot seasons allowed FWP to work out details before applying the concept on a broader scale in 2016-17. "There is definitely a learning curve, but that was one point of the pilot seasons," says Ken McDonald, head of the FWP Wildlife Division. "This year we'll need to work more closely with other state and federal agencies beforehand, make sure large landowners know the seasons are coming, and budget more help from game wardens, Block Management crews, biologists, and front desk staff."

Despite the strong interest, some Montana hunters have criticized the shoulder season concept. They say it's not an acceptable way to reduce elk populations in areas where landowners have denied public access to bull elk during the regular season. And some hunters were frustrated they couldn't locate landowners willing to allow access, while others said many landowners were already "full" of hunters by the time they reached them.

Yet hundreds of hunters who visited the FWP office in White Sulphur Springs were put in touch with local landowners looking for elk herd reductions. Though FWP has yet to tally the final kill and participation numbers, Bertellotti says that wardens, hunters, and landowners reported a steady harvest in the pilot hunting districts.

> "We created the shoulder seasons to manage elk and use public hunting as a way to do that."

"I think we're seeing the start of a real success story," Bertellotti adds. "We created the shoulder seasons to manage overabundant elk and use public hunting as a way to do that. It's still a bit early to draw conclusions, but so far it looks like we're on the right track." ■

The new shoulder seasons will help more hunters turn Montana's overabundant elk into meat for the table.

Golden eagle? No, it's a juvenile bald eagle.

What eagle is that?

Montana is home to both golden and bald eagles. Mature goldens and balds are easy to distinguish just by looking at the head or tail—the bald eagle's are white and the golden eagle's are brown. But younger birds (ages one through three) of both species are not so easy to distinguish. For instance, bald eagles don't get their trademark all-white head until about age four. Until then they have a dark head, like a golden's. And juvenile golden eagles sometimes have white patches on their underwings, making them easy to mistake for juvenile bald eagles, which also have white underwing areas.

One helpful clue for telling the species apart may be where you see them. Bald eagles are often around rivers, streams, or lakes, where they feed on fish and, in winter, waterfowl. Goldens are most common in open prairie and mountain foothills, where they can find jackrabbits and ground squirrels. Also, a bald eagle soars with its wings nearly flat—"like a plank," as one bird expert has described it—while the golden eagle soars with wings in a shallow V. From a distance, golden eagles often are mistaken for turkey vultures, a large dark bird that also soars with wings in a shallow V. ■

Keeping Forests FORESTED

How a little-known federal program is protecting rural jobs, wildlife habitat, water quality, and recreational access in western Montana. By Allen Morris Jones

GREEN LIVING Grizzly bears are among the dozens of western Montana wildlife species benefiting from forest habitat protected by the Forest Legacy Program.

TONY DYNOR

Each fall Whitefish resident Steve Thompson hunts deer in the foothills of the Whitefish Range, on a piece of ground known as Haskill Basin. Over the years, he's killed half a dozen whitetails in the scenic forested basin, spotted grizzly tracks, listened to wolves howl, and marveled at moments of complete stillness and quiet. It's a wild and beautiful place. And it's just two miles from the Whitefish city limits.

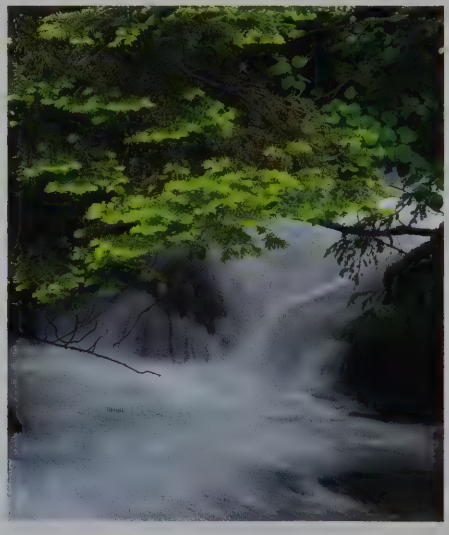
A longtime hunter and conservationist, Thompson co-founded the local Whitefish Legacy Partners conservation group and worked for both the Montana Wilderness Association and the Forest Stewardship Council. He's a big fan of the Haskill Basin. "I use that area in all four seasons," he says. "I go there to pick huckleberries. I go cross-country skiing. That place is bread and butter for me."

But that special place—3,000 acres of privately owned timber—might well have been altered forever, going the way of the Gallatin, Bitterroot, and Paradise Valleys. Subdivisions were metastasizing all around Haskill Basin. There was really no good reason to think it wouldn't make that now-familiar transition from forest to exposed trusses and Tyvek house wrap, multiple aluminum mailboxes, and long asphalt driveways.

For Whitefish residents, the possibility of subdivisions threatened more than their access to recreation. Haskill Basin supplies roughly 80 percent of the city's municipal water supply. Every time Thompson takes a shower or fills his coffeepot, the water comes from this watershed.

The heart of Haskill Basin has been owned for more than a century by F.H. Stoltze Land & Lumber, Montana's oldest family-owned wood products company. For decades the municipal water supply agreement between Stoltze and Whitefish had been informal, a handshake accord of the sort you don't see much of anymore. Stoltze has long been a gracious and conscientious corporate neighbor, a major local employer that allows public use on most of its lands.

But every year it made less and less financial sense for Stoltze to maintain the status quo. Single-family homes close to Haskill Basin were selling for $3 million and more—prices that would make even the most conservation-minded board member step back and reconsider. And if the company sold Haskill Basin? The loss to the community would be incalculable. Whitefish land prices being so exorbitant, how could the city ever afford to buy the property from Stoltze? On the other hand, given the value of the property, how could Stoltze afford not to sell?



CLEAN WATER A stream on F.H. Stoltze Land & Lumber property that feeds the water supply of Whitefish. The watershed is now protected with a new conservation easement.

Allen Morris Jones is an author and the owner of Bangtail Press in Livingston.

Response to forest loss

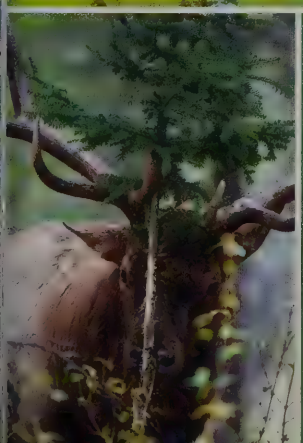
When hitting on all cylinders, land and water conservation is usually a win-win for everyone involved. The brightest moments in conservation history are when disparate interests come together over a shared goal and find common ground to the advantage of all parties.

That's the concept behind the Forest Legacy Program, a little-known conservation workhorse administered by the U.S. Forest Service. Forest Legacy was created in 1990 in response to widespread development turning the nation's privately owned forests into "nonforest uses"—housing estates, golf courses, and other commercial sites. The conversion of timberland hurt logging and sawmill businesses, cut off recreational access, fragmented critical wildlife habitat, and degraded streams with sedimentation and leaching septic systems.

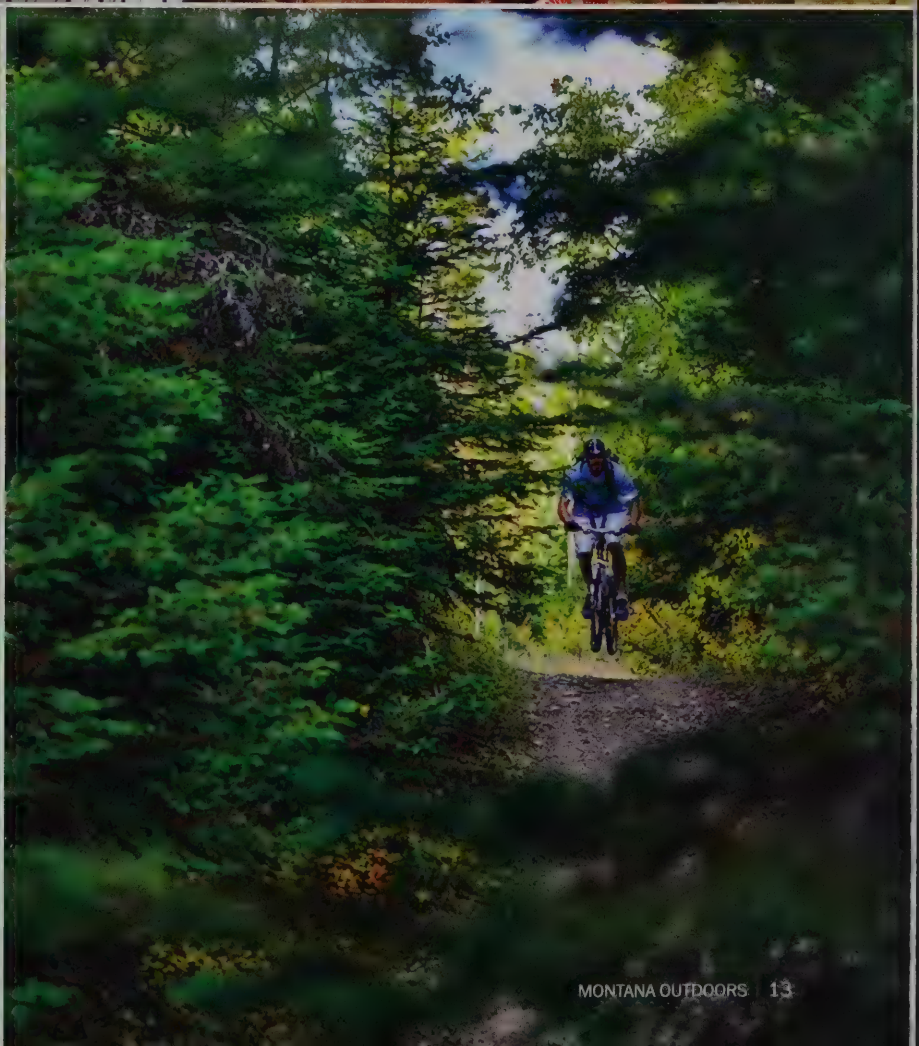
One solution was a new federal program that makes grants to states to "keep working forests working," as Tom Tidwell, U.S. Forest Service chief, told reporters last year at an event in Washington, D.C. celebrating Forest Legacy's 25th anniversary. The program maintains intact forests mainly by helping states purchase conservation easements—land agreements through which willing private landowners sell development rights but retain ownership and the right to harvest timber.

Forest Legacy works like this: In each state the governor appoints a state agency to work with conservation groups, local forest landowners, and others to submit applications to the Forest Service for review. A panel of state and federal officials from across the country then ranks the projects. The panel gives priority to forested lands with "nationally significant resources" that would provide the most public benefit and, at the same time, are most threatened by development. Federal funding, always limited, goes to the highest-ranking projects to help the states either buy

CLOCKWISE FROM LEFT: RANDY BEACHAM; SHUTTERSTOCK; STEVEN GNAM; TONY BYNUM; STEVEN GNAM



WHICH FUTURE FOR FORESTS? Top: As forests across the United States were converted into housing and retail properties, Congress enacted the Forest Legacy Program in 1990 to "keep working forests working." Beneficiaries include rural sawmills; hunting, fishing, and other recreation (above and right); and habitat for elk and other wildlife (left).



GREAT GAINS From left to right: FWP wildlife habitat biologist Alan Wood, Stoltze vice president and general manager Chuck Roady, and Whitefish mayor John Muhlfeld discuss the Haskill Basin and Trumbull Creek conservation easements that protect forest in the city's watershed. In addition to helping the Whitefish water supply stay clean, the easements protect spawning habitat for westslope cutthroat trout (left) and preserve vast scenic vistas (below).

a conservation easement or, in some cases, purchase the property.

The federal money comes mainly from the Land and Water Conservation Fund, a program that uses royalties from federal offshore gas and oil drilling leases to support a wide range of recreation and conservation projects nationwide. Forest Legacy requires that matching funds come from various state programs, such as FWP's Habitat Montana, and donations from landowners and conservation groups.

If all this talk of projects and funding seems a bit dry and dull, consider what Forest Legacy benefits. The program helps ensure that private lands with public value are appropriately and permanently protected from development. That keeps mills running, maintains access to hunting and other recreation, allows mountain streams to continue running clean and clear, and sustains intact landscapes that support important fish and wildlife populations.

Remember that "win-win" concept mentioned earlier? Forest Legacy is win-win multiplied several times over.

Number one, twice

Because Montana's forest fish and wildlife populations—including lynx, wolverine, grizzly bears, and bull trout—are recognized worldwide, Montana Fish, Wildlife & Parks is the state's point agency working with the Forest Service on the program. According to Alan Wood, an FWP wildlife habitat biologist who works extensively on Forest Legacy proposals from his office in Kalispell, roughly 90 applications are submitted to the Forest Service each year from 49 states and six U.S. territories. Each one makes a strong case as to why *this* project is so important.

The combination of Montana's significant forest resources and the enormous effort from dedicated landowners, other partners, and FWP staff has resulted in Forest Legacy contributing more than $52 million to the state's forest conservation since 2000. The money has helped secure 23 different projects and 210,000 acres of prime forest land. To top it off, Montana currently has two projects with nationwide rankings of number one (in 2014 and 2015, respectively)—Haskill Basin and nearby Trumbull Creek.

"Keep in mind that Montana got started with Forest Legacy only in 2000, about 10 years after the program started," says Wood. "We've been very competitive and successful since then, and are now number two in total funding—behind only Maine—and number three in total acres, behind Maine and New Hampshire."

On the Haskill Basin project, Wood says the Trust for Public Land (TPL) was a key partner with FWP and other groups. "Their

F.H. Stoltze Land & Lumber Company, Columbia Falls

> "There's no question we could have generated a lot more money if we'd wanted to. But the other options wouldn't have allowed us to keep growing trees to supply our sawmill and keep our employees working."

project manager, Alex Diekmann, was tireless in working closely with Stoltze and the city of Whitefish to figure out how to make this deal work," he says. Diekmann and others at TPL also helped obtain millions of dollars in federal funds and assisted in polling city residents to see what funding mechanism they'd be most willing to accept to raise necessary funding. "Unfortunately, Alex died just as the Haskill Basin project was completed, and he'll be sorely missed by all of us who worked with him," says Wood.

An appraisal put the worth of a conservation easement on Haskill Basin at approximately $20 million. The Trust for Public Land helped secure $9 million from the federal Endangered Species Grant Program; the city of Whitefish, by levying a voter-approved 1 percent resort tax increase, will contribute $7.7 million; and Stoltze agreed to sell the easement for $3.3 million below appraised value. "There's no question we could have generated a lot more money if we'd wanted to," says Chuck Roady, Stoltze vice president and general manager. "But the other options wouldn't have allowed us to keep growing trees to supply our sawmill and keep our employees working."

Forest Legacy conservation easements in Montana are held by FWP, which monitors the land and enforces the agreements. Private landowners still own the deeds and continue working their properties under the terms of the easements. Haskill Basin and Trumbull Creek combined supply around 10 percent of Stoltze's lumber needs, says Roady. "The easement keeps these working forests in private ownership, where we still pay taxes and get to maintain our strong commitment to the land and the resources we manage," he adds. Wood notes that Stoltze has a long history of sustainable forest management and is certified by the American Tree Farm System and Sustainable Forestry Initiative, both widely recognized as industry standards of quality.

Whitefish mayor John Muhlfeld, who has a background in water resources and hydrology, has been working on the deal for the last four years with the support of city residents. "When we went to the voters with a special election to increase the resort tax, it was overwhelmingly approved by 84 percent of Whitefish voters," he says.

Pockets of greenery

Montana's other top-ranking Forest Legacy project, Trumbull Creek, sits next to Haskill Basin and is also owned by Stoltze Lumber. At 7,150 acres, Trumbull Creek provides a sizable complement to Haskill. The two projects conserve a portion of this Crown of the Continent ecoregion, maintain stunning

CLOCKWISE FROM TOP LEFT: JEREMIE HOLLMAN; F.H. STOLTZ LAND & LUMBER CO.; CRAIG MOORE; KEN ARCHER

views, and protect habitat for Canada lynx and grizzly bears. Both properties are readily visible from most of the Flathead Valley, particularly U.S. Highway 93 on the drive north toward Whitefish.

According to Wood, as many as 2,400 new homes have been built within a five-mile radius of the Trumbull Creek property in the last decade. Without too much imagination, it's easy to imagine a time when Trumbull Creek and Haskill Basin will be conspicuous pockets of greenery, quiet asylums of clean streams and woodpeckers, thumping ruffed grouse and bugling elk, within the surrounding roof lines and gables.

Both the Haskill Basin and Trumbull Creek projects have been funded by the Forest Service in the agency's 2016 budget. "Trumbull Creek is still short on some matching funds, but it appears on track for completion," says Wood.

Congress recently approved the Land and Water Conservation Fund for another three years and included a budget for the Forest Legacy Program. That's welcome news for forest conservationists in western Montana. "LWCF has been instrumental in funding Forest Legacy and other conservation and recreation programs, so we're real pleased it was approved and that Montana's entire congressional delegation supported its reauthorization," says Wood.

That gives the FWP biologist at least another three years to submit additional Forest Legacy project applications. Then he'll see if Montana can again be ranked among the states with the top-scoring—and most likely to be funded—forest conservation proposals.

Other Forest Legacy Lands

Western Montana is home to 23 Forest Legacy Program projects totaling more than 200,000 acres. They range from the 80 acres of the two Windfall Creek conservation easements—an ecologically rich forest laced with pothole lakes and mountain streams next to the Flathead National Forest—to the massive 142,000-acre Thompson/Fisher conservation easement near Thompson Falls, a forested mountain-valley landscape that provides vital winter range for many wildlife species and both hunting and fishing recreation for thousands of visitors each year.

Project/Tract Name	Location	Completed	Acres
CONSERVATION EASEMENTS			
Manley Ranch	Blackfoot Valley	2001	7,900
Dalton Mountain	Blackfoot Valley	2008	4,891
Thompson/Fisher	Lincoln, Sanders & Flathead Counties	2003	142,015
Stimson Forestlands Conservation Project	Lincoln County	2012	27,992
Schiemann	Bitterroot Valley	2004	302
Swan Valley State Forest	Swan Valley	2006	7,204
Coyote Forest	Swan Valley	2006	80
Creek Tract I	Swan Valley	2007	318
Condon Creek	Swan Valley	2007	160
Cooney Creek II	Swan Valley	2007	110
Salmon Prairie	Swan Valley	2007	294
Pierce Lake	Swan Valley	2007	444
Glacier Creek	Swan Valley	2009	641
Abbott Creek	Swan Valley	2009	113
Wolf Creek I	Swan Valley	2009	92
Wolf Creek II	Swan Valley	2009	93
Birch Creek Tract I	Flathead Valley	2006	160
Cedar Creek	Flathead Valley	2010	157
Windfall Creek 20	Flathead Valley	2010	20
Windfall Creek 60	Flathead Valley	2010	60
Total CE acres			**193,046**
FEE TITLE			
Blackfoot-Clearwater	Blackfoot Valley	2005	4,124
Clearwater WMA	Clearwater Valley	2011	10,236
North Swan Valley	Swan Valley	2006-09	2,212
Total fee acres			**16,572**

SOURCE: MONTANA FWP

Blackfoot-Clearwater WMA

LEFT TO RIGHT: PAUL N. QUENEAU; RANDY BEACHAM

DRINK UP Working forests saved from overdevelopment by the Forest Legacy Program can continue producing water, wildlife, and jobs far into the future. Shown here: a pristine Haskill Basin creek on Stoltze property near Whitefish.

SNOWMEN

Predicting summer stream flows requires dangerous high-altitude expeditions in late winter and early spring.

By Hal Herring

The lynx was a smoke-colored spirit-figure, perched on the bleached yellow carcass of the old bull elk, which lay on the ice of the North Fork of the Sun River. As we skied closer up the wind-scoured surface of the river, the ghostly cat detached itself from the carcass and disappeared in fluid leaps up an overhanging wall of snow and into a small copse of firs. We stopped on the ice to admire the bull, dead of starvation or old age, and to study the torn hide and deep furrows in the neck muscles where the lynx had been rasping away the frozen meat with its tongue. The bull's antlers were massive, mahogany and ivory, spattered with the white guano of jaybirds and magpies that had perched there, waiting for some stronger predator to open the hide to the nourishing meat and spider-web patterns of fat within. I tried to take a photo, but my camera was frozen.

We were on the first day of the annual Bob Marshall Wilderness snow survey in late February, and the temperature was staying steady at minus 12 degrees F. during the middle of the day. All around us, the great valley of the North Fork yawned, an arctic vastness locked beneath more than 4 feet of snow beginning to blow and billow before the razor-slash of a bitter north wind. We crossed the river, sidestepped up the banks, and kept moving, single file, following Russ Owen—in his early 40s the strongest and youngest among us—breaking trail through wind-crusted powder. Nobody spoke, since all breath was needed for driving the skis forward across the expanse. It was 12 miles or so up Goat Mountain to the survey site and then back across the valley to Cabin Creek, where a U.S. Forest Service cabin waited like a friendly island with food, woodstove, and sleeping bags. We had a 75-mile loop to make, three snow courses to survey, and five days to do it all.

TRUDGERY Snow surveyors follow a backcountry "snow course." At sites along the way, they stop and measure snow depth and snow water content—information federal forecasters will later use to determine summer stream flows for fish and irrigation.

For safety, wilderness snow surveys require at least four people. This one had Kraig Lang, the longtime backcountry ranger for this part of the wilderness; Bill Avey, supervisor of the Helena and Lewis & Clark National Forest, who was seeing this part of his territory for the first time; trailbreaker Russ of Choteau, a wildland fire specialist; and me, a volunteer and writer/layabout who lives in the group's launch point of Augusta. Kraig had done this survey loop almost 40 times, three times per year, in February, March, and April, for the past 13 years. The surveyor before him, Ray Mills of Choteau, completed his 100th loop the year he retired.

Our job was to help determine how much water will come down the North Fork of the Sun River, go into Gibson Reservoir, and be available for maintaining fish survival as well as irrigating the agriculture that turns the wheels of this part of Montana's economy. In particular, this wilderness snowpack will provide the water for the 83,000 acres or so of the Greenfields Irrigation District, which in turn makes the small town of Fairfield the celebrated "Malting Barley Capital of the World." Anheuser-Busch is the major buyer of the crop, so every American who hoists a cold Budweiser at the end of the workday can toast the visionaries who, in 1897, created one of the nation's first

Hal Herring is Field & Stream's *conservation blog editor, a professional pine cone harvester, and author of* Famous Firearms of the Old West. *He lives in Augusta.*

ALL PHOTOS FROM USDA NATURAL RESOURCES CONSERVATION SERVICE, EXCEPT PHOTO OF JAMES E. CHURCH, FROM UNIVERSITY OF RENO.

national forests here, and also toast the wild and jumbled Rocky Mountain Front itself, as well as the howling blizzards like the one we found ourselves caught in.

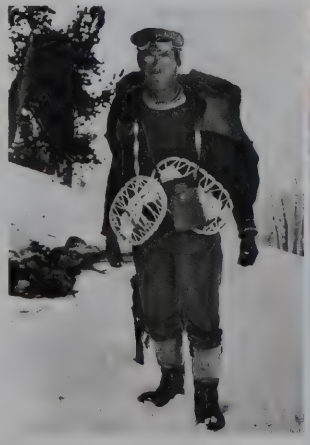
The Goat Mountain snow survey site predates the 1964 creation of the Bob Marshall Wilderness and was originally accessed by helicopter. Because wilderness designation prevents motorized use, this survey turned into a cross-country skiing adventure. In the half-shelter of the timber, I stopped to put on my skins (long strips of fabric backed with glue that you stick to the bottoms of your skis so you can climb uphill without slipping). I soon found myself left far behind by my more experienced, skin-less companions, who had backcountry ski skills I had yet to master. By the time I caught up, Kraig and Russ were assembling a 10-foot, 1.5-inch-diameter tube from the survey kit. The tube, called a "corer," has a serrated lip that cuts a core sample through the snow to the ground below. The snow depth is recorded, but more important is the water content of that snow, determined by how much the core sample weighs. We hung a little scale from a ski pole and recorded the sample, giving us a good idea of how much water was in the snowpack. We proceeded on to a series of nine more stations, called the "snow course," Russ making notes and calculations in a small waterproof notebook, hunching over the pages to shield them from wind and blowing snow.

"Bitter water war"

The snow-sampling system is an idea of simple genius, invented by a visionary pragmatist. In 1906, James E. Church was an athletic Michigander with a wandering intellect and feet to match. Church was educated in Germany, and made his living as a professor of Latin, German, and the fine arts, but his true passions lay in the studies of science and weather. While teaching at the University of Nevada, he established one of the nation's first high-altitude weather stations, at 10,785 feet on the summit of Mount Rose, the tallest peak in Nevada's Carson Range. At the time, California and Nevada were engaged in what was described as "a bitter water war" over rights to the Truckee River and Lake Tahoe. Church was among the first to try to understand, before the irrigation season began, how much water could be expected from those critical irrigation sources. His tools, which he invented, were the corer (marketed as, and still called, the "Mount Rose Snow Sampler"), the scale, and "the snow course," a series of measuring sites that vary by aspect and elevation, exposure, and shade. Taken as a whole, the tools create a critical picture of the coming flood and irrigation season.

WATER FORECAST Backcountry snow surveyors follow set courses, using corers and scales invented by James E. Church in the early 1900s to sample snowpack.

Church's system was adopted across the West. In 1935 the USDA's Natural Resources Conservation Service (NRCS) created the Snow Survey and Water Supply Forecast. It now includes 900 manual snow courses as well as 750 automated Snowpack Telemetry Weather Stations (SNOTEL) across 13 western states including Alaska, mostly in high mountain watersheds. SNOTEL stations automatically deliver snowpack and water equivalent information to the NRCS via VHF radio signals, but manual snow courses in wilderness areas are still monitored by humans (which is what my companions and I were doing). Church's system adds up to a huge collection of information about the one thing the arid West cannot survive without. For snow surveyors, it means a lot of time in high mountain weather during late winter and early spring. Following snow courses in wilderness areas like the Bob Marshall requires skiing and snowshoeing in February and March, and then hiking and horseback riding in April during low-snow years. It's a job many people come to love—despite the hard work and unpredictable, even dangerous weather. As Kraig once told a reporter who asked about his winter work, "I spend three weeks of the month dreaming about one week of the month."



GENIUS Left: James E. Church in 1920. Above: USDA snow course markers are posted at all 750 snow course sites in western states.

Mashed potatoes

On day four we left Gate's Park for Wrong Creek, dawn light under strange skies and tendril clouds traveling at warp speed on a south wind. The upper snowpack went to heck under a grim sun and 40-degree temperatures, and it was like trying to ski in coarsely mashed potatoes, our clothes soaked from sweat and melted snow. We worked the snow course without talking, ate too lightly in the heat, and scattered out on the return, our hunger sucking away all grandeur from the landscape, rendering it a lonesome monotone of white and gray. The barometer must have been on a roller coaster, as we watched and felt the cold front move in.

By dawn it was minus 22 degrees, and blowing hard from the north again. The track we'd made coming up the valley was wiped away, the mashed potatoes now a fine powder that moved in hallucinatory patterns around our knees. I zipped up my windjacket and tightened my hood. When I exhaled, my trapped breath frosted my sunglasses with blinding rime. We had another survey site to visit that day, and it was 16 miles away.

Time To Mate?

The amazing strategies mammals have devised for determining when to reproduce.

By Kerry R. Foresman

PHOTO BY STEVEN AKRE

NOT TONIGHT Large mammals such as moose, which have pregnancies lasting eight to nine months, don't mate in spring because calves would be born during the brutal conditions of midwinter rather than in warm, fertile springtime. That's why the moose, elk, and deer rut is in early fall. Other mammals also adjust their mating seasons to ensure that young are born when food and temperatures are optimal.

Imagine you are a cow moose and want to have a calf. It's springtime, and all around you birds and small mammals have begun their yearly ritual of courtship and mating. Within a few weeks or months, their young will be born to take advantage of the lush vegetation and other foods. The problem is that you're a big mammal, and big female mammals are pregnant for eight to nine months. That means if you mate with a bull moose now, you would give birth in midwinter—not a good time for you, and especially not for your newborn calf.

So what do you do? Like all other large ungulates, you don't mate now but wait until fall. That way, your calf is born in spring, when food is abundant and the weather is warmer.

Kerry R. Foresman, of Missoula, is an emeritus professor of biology at the University of Montana and the author of Mammals of Montana.

This is known as a reproductive strategy.

The reproductive strategy for all mammal species is to breed successfully, carry their young to birth, and provide as much initial help as possible to ensure the offspring can grow rapidly and fend for themselves. For this to happen, animals have evolved all types of strategies to time both breeding season and birth to coincide with the best possible environmental conditions.

A big factor in reproductive timing is an animal's body size. Smaller species grow more quickly, age more rapidly, and have shorter lifespans than larger species. The same is true for gestation: Smaller mammals have far shorter pregnancies than larger ones. For instance, tiny shrews give birth after a gestation period of just 21 days, compared to the 248 days, on average, for elk.

Larger species such as elk and deer, because of their size, can afford to breed in fall, when food for the breeding adults is still abundant. After the rut, gestation extends throughout winter, the birth perfectly timed to the spring renewal of new plant growth. The young of these large mammals enter the world as temperatures are warming and their mothers have abundant food to support the "energetic costs"—calories used—of milk production. Ample time is available for young to grow up through summer so that, as fall and winter approach, they have built up fat reserves and grown a winter coat.

For this reproductive strategy to work, large mammals need to breed at the right time. Mate too early in fall, and their young will be born when environmental conditions are still too harsh for the baby animal and its mother to survive. Breed too late, and the young is born too far along in summer to have enough time to grow large and strong enough to withstand the following winter.

To ensure they mate at just the right time, mammals have evolved to breed during specific photoperiods, or day lengths, for their species and environment.

17-HOUR WINDOW

For instance, consider the reproductive biology of elk. The male's testes, which had shrunk at the end of the previous breeding season, start growing again in midsummer, responding to decreasing day length. Studies conducted at the National Bison Range showed that bulls become reproductively active in mid- to late September, a period known as "the rut." That's also when cow elk enter estrus and become receptive to the males. Females cycle through estrus approximately every 21 days during fall. Within this 21-day cycle, females are only in heat, allowing males to breed, during a 17-hour window. If

TIMING IS EVERYTHING Above left: Elk mate in late September and early October as decreasing day length triggers hormonal changes. Birth (above) comes 248 days later, usually a week or two before or after June 1. Raccoons, a much smaller mammal, can mate in late January or early February because their gestation length is just 63 days.

LEFT TO RIGHT: TIM CHRISTIE; MEG SOMMERS; MASLOWSKI WILDLIFE PRODUCTIONS

the female is bred, the pregnancy continues unabated for eight months and she will produce a calf in the spring. If the cow does not successfully conceive, she will cycle again and have another 17-hour breeding opportunity midway during the following 21 days.

This pattern will repeat itself until mid-December. Around the time of the winter solstice, day lengths start to increase, triggering in elk a change in hormonal pattern that causes males' testes to regress and females to enter a nonreproductive state until the following fall.

If a female is unable to conceive until mid-November or early December, her offspring will not be born until the following August or September and then not be weaned until November or December. These offspring rarely survive.

Such late pregnancies are quite rare, however. Elk work hard to reproduce, and most breeding is finished by early October. Not only do bulls seek cows, as everyone knows, but cows also seek bulls. In fact, a cow selects which bull's harem to belong to, and she sometimes "harem shops" to pick the best bull to be the father of her calf. Females size up males based on scent, aggressiveness, and antler size. In Montana, almost all calves are born within a week or two of the historic birth peak of June 1.

While fall breeding works perfectly for large animals like elk, it would be disastrous for smaller species. For instance, if striped skunks bred in fall, their short gestation period would mean the young would arrive in midwinter. Smaller animals have instead evolved to breed in late winter or early spring so that lactation occurs during the warmer, lusher months. Species such as shrews, rabbits, hares, and lynx have developed this reproductive strategy to great success.

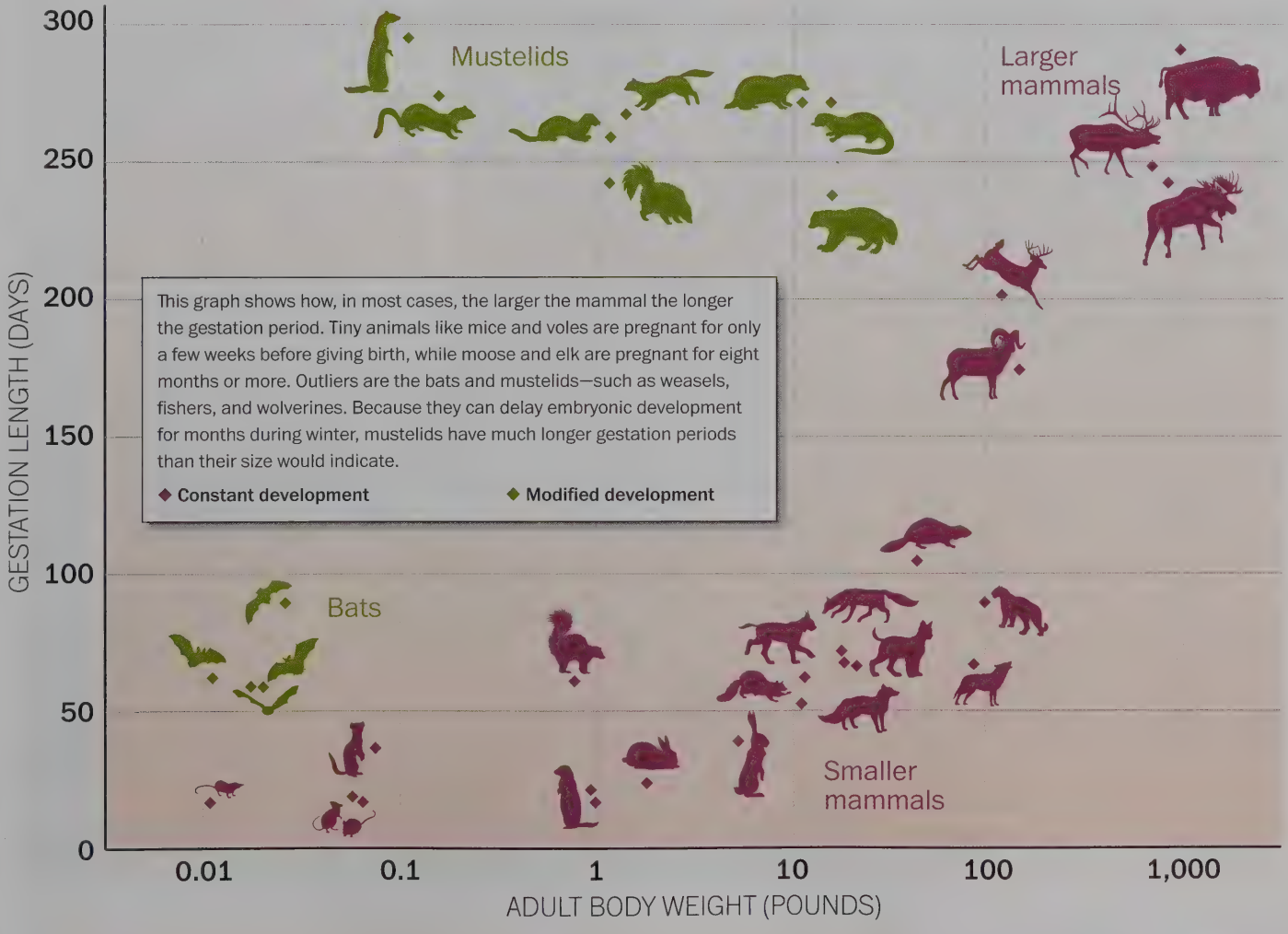
Montana's raccoons, for instance, have a gestation length of 63 days, so they begin breeding in late January to early February. That allows the young to be born as early as March, when temperatures become tolerable for the newborn kits and food becomes more abundant for the lactating mother.

If raccoons mated any later, the young would not be born in time to grow large and strong enough to face the upcoming winter.

DELAYS AHEAD

For most mammals, gestation continues unabated once conception occurs. But there are notable exceptions, mostly among the

The Bigger the Animal, the Longer the Pregnancy (Usually)


300
250
200
150
100
50
0
GESTATION LENGTH (DAYS)
Mustelids
Larger mammals
Bats
Smaller mammals
0.01
0.1
1
10
100
1,000
ADULT BODY WEIGHT (POUNDS)
This graph shows how, in most cases, the larger the mammal the longer the gestation period. Tiny animals like mice and voles are pregnant for only a few weeks before giving birth, while moose and elk are pregnant for eight months or more. Outliers are the bats and mustelids—such as weasels, fishers, and wolverines. Because they can delay embryonic development for months during winter, mustelids have much longer gestation periods than their size would indicate.
◆ Constant development
◆ Modified development

mammal family known as the mustelids.

Montana's mustelids include the wolverine, northern river otter, fisher, pine marten, mink, black-footed ferret, and three weasel species. Many of these mammals have evolved to suspend gestation during the pregnancy by what's known as "delayed implantation." Here's how it works: After the egg has been fertilized, it reaches the blastocyst (embryonic) stage, becoming a tiny hollow ball of several thousand cells. Rather than implanting in the uterus, as normally occurs in pregnant mammals, the embryo floats freely in the uterine space for many months, increasing only slightly in size. Finally, the embryo attaches to the uterus and proceeds with normal fetal development.

For example, the long-tailed weasel breeds in July, when weather is warm and prey is abundant, but the blastocyst arrests its development shortly after forming, six to eight days after conception, floating in the uterus for roughly eight months until March. Then implantation occurs and development rapidly proceeds. The young are born in April, after a nine-month gestation. Though the female is pregnant this entire period, her embryos are so tiny during most of the pregnancy that she doesn't need to expend much energy growing them.

Why do mustelids delay pregnancy and not breed in spring like other similar-sized mammals? For instance, you'd think that a long-tailed weasel, small as it is, could complete its entire reproductive cycle in one spring, as does the similar-sized Columbian ground squirrel. But young weasels need the extra month or two that delayed implantation provides in order to develop their hunting skills—something other small mammals, most of them herbivores, don't need to do.

Bears also undergo delayed implantation, though for years scientists weren't certain of this. In 1983, I showed that black bears underwent this biological reproductive process by measuring the reproductive hormone progesterone in the blood of pregnant hibernating female bears. I learned that embryonic implantation occurs in late November while a bear is in its den, and that the young are born two months later, in late January. During the total gestation of roughly 225 days, delayed implantation takes place for 145 to 165 days. Other research worldwide has since shown that grizzlies and all other bear species follow the same pattern.

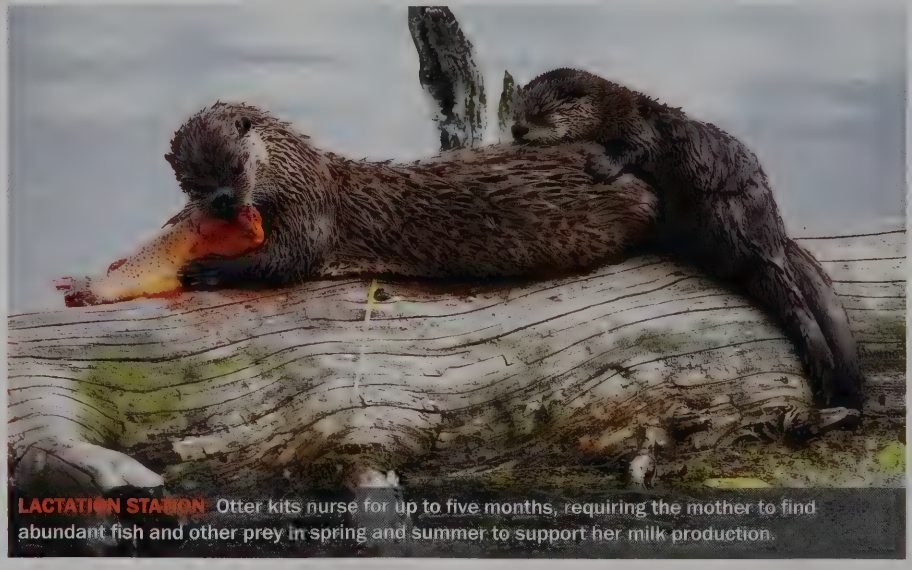
STILL TOO COOL

Bats are another family of mammals with odd reproductive strategies. Several species in Montana breed in fall, or even winter as

SPRINGTIME BIRTHDAYS Most mammals want to bear young in the warm, fertile conditions of spring and summer. Because larger animals have longer gestation periods, they can't mate in early spring but must wait until fall. Other species, like weasels, delay embryonic development so they can both breed and bear young when prey is abundant.

Reproductive research uncovers new skunk species

Until the 1960s, all of the spotted skunks found across the United States were considered to be the same species. Then Rodney Mead, a graduate student at the University of Montana, began looking at their reproductive biology and discovered something startling. Populations living in the western United States exhibited delayed implantation, breeding in late September and delaying their pregnancies so they could give birth in May. Yet spotted skunks found in states east of the Continental Divide bred in March, exhibited no delay, and gave birth in June. Thus, the eastern and western populations were reproductively isolated. With this information, Mead classified two species: *Spilogale gracilis* in the west and *S. putorius* in the east.



LACTATION STATION Otter kits nurse for up to five months, requiring the mother to find abundant fish and other prey in spring and summer to support her milk production.

LEFT TO RIGHT: WIKIPEDIA; CINDY GOEDDEL; DONALD M. JONES

they enter hibernation, but then the female stores the sperm in her reproductive tract for several months without ovulating. She is able to warehouse sperm in this manner until determining when fertilization will occur and the pregnancy will begin. The female bat then simply ovulates, the sperm she has stored inside her fertilizes the egg, and a fetus begins to grow. Now things get really interesting.

Females of some species, like the Townsend's big-eared bat, slow down or speed up the rate of fetal development by adjusting their body temperature. At the cooler environmental temperatures of around 40 degrees F. in the abandoned mine or cave where the female hibernates during winter, development proceeds very slowly. As spring approaches, she raises her body temperature and exits the hibernation site to sample the environment.

If it's warming and flying insects are about, she'll return to the hibernation site and raise her body temperature further to quicken fetal development. But if the outside temperature is still cool, such as during a late spring, she'll lower her body temperature to reenter hibernation and slow down fetal development.

The female bat continues to regularly test the environment until deciding that spring has arrived and food is available. For Townsend's big-eared bats, this ability to delay development allows a female to vary her length of gestation from 56 to over 100 days, thus fine-tuning her pregnancy to meet a changing environment.

Why such a complicated reproductive strategy? We're still not sure. Bats are some of Montana's smallest mammals, they hibernate, and they require considerable energy (from eating insects) to support lactation. By adjusting fetal development, it appears that the female can reduce her energy demands while bearing her young at a time when insects are more abundant for her and the kits have time to mature before winter.

The need to reproduce is common among all mammals. But how each species goes about that process varies widely. These different reproductive strategies reveal amazing behaviors and adaptations that demonstrate the remarkable lengths Montana's wildlife will go to survive and thrive.

RIGHT ON SCHEDULE By breeding in fall, a cow moose can begin growing the fetus while her fat reserves are ample, then give birth in spring when vegetation is abundant to meet the "energetic costs" of lactation during the months when her calf is nursing.

FIREARM FAIR Buyers look for bargains at a gun show in Great Falls. Part of Montana's culture, gun shows are a modern equivalent of the early 19th-century fur trading "rendezvous."

Pistol Whipped

Turns out a gun is only worth what someone is willing to pay for it.

By Michael J. Ober

Over the past century and a half, countless firearms have been made with the care and craftsmanship of a fine Swiss watch—delicate but deadly combinations of machining, actioning, filing, engraving, and finishing. That's certainly how I viewed my vintage Colt Model 1903 .32 semiauto handgun. I suspected its enormous value when I received it, via old family connections, then confirmed its worth with some homework and preliminary phone calls. It was no less than a collector's dream, one of the first hammerless Colt semiautomatics ever made, complete with the right serial number. Sure, I hadn't tested its real worth at an actual gun show, but I could just see collectors there begin to salivate once they saw it. Since I didn't have any particular attachment to it, I calculated that with the proceeds I could invest in something I really had an interest in, like a Parker side-by-side or other fancy English shotgun.

So with an admission stamp on the back of one hand and my precious pistol in the other, I passed the security people and waded into the shoulder-to-shoulder mass that is one of Kalispell's numerous gun shows. The Northwest Montana Arms Collectors Association's two Kalispell events—in April and September—have become huge successes since they began in 1958. Held at the Flathead County Fairgrounds, each show draws up to 1,000 visitors per day for three days. The shows feature from 60 to 250 tables and are sponsored by the association's 70 to 100 members. Across the state, gun shows are generally rated by the number of tables exhibitors rent. The smallest are in eastern Montana (Circle and Terry, with fewer than 20 tables), and the largest is in Missoula at the University of Montana's Adams Center, with more than 400 tables.

Each year six gun shows are held at the Kalispell fairgrounds. Three separate professional show "promoters" sponsor each event. It's big business for the whole community. Like a farmer's market for sportsmen and sportswomen, each show creates its own retail culture but also generates spin-off trade for other local businesses. Fairgrounds manager Mark Campbell estimates that the six shows have a combined economic impact to the Flathead Valley of nearly $250,000. "There's a social aspect to all of this too," he says. "And folks are always

LEFT TO RIGHT: NICK FUCCI; SHUTTERSTOCK; SHUTTERSTOCK

searching for that one particular piece to complete a collection." Kind of like a birder's life list or a stamp collector hoping to find a missing imprint.

Gun shows, then, are part of Montana's cultural and business landscape. Whether you like or approve of firearms is a moot point with Montanans. Our fiercely independent nature values the opportunity for ownership and use. And a public showing of sporting arms for displaying, trading, selling, or buying is at the center of that independence.

Gun shows are modern versions of the fur trading era's "rendezvous," where early 19th-century trappers gathered each year to restock supplies, tell stories, renew acquaintances, and swap trade goods. Our contemporary gun exhibitions have the same trademarks. But instead of horses grazing in a nearby pasture, today's gun rendezvous features a parking lot next to the fairgrounds full of RVs, campers, utility trucks, and trailers with colorful license plates from all over the Pacific Northwest and Canada. Like rodeo performers, most exhibitors attend all the shows on the state circuit, says Campbell. It's the just-right venue for small entrepreneurs in search of a retail outlet with minimal overhead and no property taxes.

The Kalispell show held roughly 250 tables of guns, scopes, ammunition, and shooting accessories. The devices had been chiefly engineered to help deliver meat to the freezer, punch neat holes in faraway pieces of paper, or defend a person's life and home, judging by the staggering assortment of firepower on display. A gun show also contains wares of skilled artisans. I saw handmade leather clothing and purses, beads, handcrafted knives, hats, gun safes, and scabbards, and lots of down-home camaraderie. It was a close-knit bunch, celebrating history and lore.

As for the firearms, many were inexpensive old guns and a few were authentic collectibles, such as a $500,000 rifle supposedly owned by Czar Nicholas IV. But most were known simply as "shooters." They weren't valuable collectibles destined for a showcase but were used for hunting, target practice, or self-defense.

Many attendees seemed to be pondering ways to part with a paycheck for another

Sure, I hadn't tested its real worth at an actual gun show, but I could just see collectors there begin to salivate once they saw it.

firearm—and pondering even more how they would justify to their spouse why they needed another gun when they so seldom shot the ones they had.

If you are a browser, a gun show can be entertaining and educational. If you are an earnest seller, like I was, you need to know how the process works. One exhibitor advised me to locate someone with similar makes and calibers on display, someone who "knows Colts." Of course. Go right to the experts and engage in the spirited art of negotiating, making offers and counter-offers. It's an old art form, played out expertly at all gun shows.

Unfortunately, I never got the chance. Though I was certain my beautifully crafted antique Colt .32 would fetch a small fortune, I quickly learned that a firearm is worth only what someone will pay you for it. I went to one Colt expert after another; none were interested in my heirloom.

"You got a shooter here," explained one exhibitor after careful examination of my gun. "If you can find the right person, you might get $125 for it. But, like I say, it's a shootin' piece and not a collectin' piece."

One hundred and twenty-five dollars? I was crestfallen.

He suggested that I talk with a gentleman he knew (they all knew each other) who was stationed at the far end of the room. He handed the gun to me. I thanked him and shuffled on, melting into the large crowd. Finally, I arrived at the Colt exhibitor's table. The fellow didn't hear well, so I had to lean right into his ear to ask him to evaluate my handgun. "This gun?" he asked in a booming voice as he withdrew it from the plastic bag I had carried it in. After a long pause, he looked up at me and smiled through a large beard. "Now, understand I'm not trying to knock your gun just so's I can buy it. I don't want the gun. I've had 'em all, probably a dozen of 'em around this period. You know, '03 to '09. It's probably the crappiest gun Colt ever made. Even had to pay a guy to get rid of one. A 'shooter,' you know."

By this point I could see I'd been on a fool's errand, and my dream of walking out of the gun show with a thick wad of cash was fading faster than gunsmoke in a windstorm. "Out here in Montana they ain't worth a tinker's damn," the old firearms dealer continued. "Now, if you was in Ohio or Illinois, you might get three bills for it straight up. No fight. Don't ask me why."

I put my pistol into the bag and walked away, giving the gentleman a wave and mouthing the words "Thanks," because I knew he couldn't hear me.

"Don't understand why they made so many of 'em," he shouted as I continued toward the exit. "I'm not puttin' your gun down, you know. It's just that..."

I took my priceless hammerless Colt .32 semiautomatic to the nearest pawn shop.

Weeks later, I took up fly tying.

Michael J. Ober is a writer in Kalispell and a professor emeritus of Flathead Valley Community College.

In December 2014, I was heading home to Missoula on U.S. Highway 89 after a weekend of bird hunting at my parent's farm near Dupuyer. Just south of Choteau, I spotted a whitetail doe leaping a barbed-wire fence that ran parallel to the highway. She continued on across the road right in front of me and we collided. Though my car wasn't seriously damaged, the impact killed the deer.

I called my cousin, who lived nearby, and he soon arrived with his pickup and helped me move the carcass to a place where I could legally field-dress it.

Later that day, I applied online (see editor's note on page 31) for an FWP Vehicle-Killed Wildlife Salvage Permit, printed it out, and had the deer, along with the permit (which acts as the possession tag), at my local processor that night.

While telling others about my accident and deer salvaging experience, I learned that many people, especially older Montanans, were unaware of the salvage permits, which FWP began issuing in 2014. In fact, I had to repeatedly reassure my father that I was not breaking any laws by field-dressing the animal before applying for the permit.

But I wanted them and others to know about the new permit, because it is prevent-

From Freeway to Freezer

How to avoid colliding with a deer, elk, moose, or pronghorn. And some good news if you do.

BY JESS FIELD

SILVER LINING Each year tens of thousands of deer and other big game animals are struck by vehicles across the United States. In 2014 Montana joined many states in allowing the roadkill to be salvaged, preventing tons of venison from going to waste each year.

LEFT TO RIGHT: ROBIN LOZNAK; BETHANN GARRAMON MERKLE

ing literally tons of venison from going to waste each year—not to mention helping remove hundreds of big game carcasses from Montana roadsides.

SENSIBLE LAW

In 2013 the Montana Legislature passed House Bill 247, sponsored by Representative Steve Lavin of Kalispell, authorizing Montana Fish, Wildlife & Parks to establish the permit. Representative Lavin is also a major with the Montana Highway Patrol. The idea originally came from a fellow trooper, and Lavin immediately thought a permit system could pay dividends. It has.

In 2014 FWP issued 1,100 permits, says Mike Lee, manager of the agency's Commercial Wildlife Permit Program. Whitetails accounted for nearly 65 percent (709) of the permits. Elk and mule deer combined for a total of 355, moose accounted for another 32, and four pronghorn added to the total. The permits are good for salvaging deer, elk, moose, and antelope only. In 2015, the total number increased to 1,269, with roughly the same percentage breakdown in species.

Dave Holland, FWP game warden in Fort Shaw, says that wildlife collisions occur year-round. During early spring, animals feed along roadsides on new vegetation

VULNERABLE VISITORS Big game animals end up as roadkill for different reasons. In spring, newly emerged vegetation attracts deer (above). In summer, elk calves and deer fawns have yet to learn the hazards of speeding vehicles. During the fall rut, reckless male elk, deer, and even moose may venture onto highways.

exposed to sunlight. Summer brings out fawns and calves less wary of traffic than adult deer and elk. During the fall rut, love-crazed bucks and an occasional bull elk or even moose wander onto highways. In winters with deep snow, big game use roadways as travel routes.

As for time of day, "the most dangerous periods are the hour after sunrise and the hour before sunset, what we wardens call 'deer-thirty.'" Holland says. "That's when deer and elk are most active, and the low light makes it difficult for drivers to see what's ahead."

SLOW IS SAFE

Traffic safety officials say the most important thing drivers can do to avoid colliding with wildlife is to drive more slowly during the hours around dawn and dusk, and scan ahead for animals on or approaching the highway. Larry Irwin, a lieutenant with the Montana Highway Patrol, says that drivers should also be especially alert when they see yellow "Deer Crossing" signs. "They are there for a reason, to alert drivers of increased potential for wildlife on or near the roadway so they can slow down," he says. Irwin adds that a slower speed allows drivers to stop before

"Swerving, though it seems intuitive, is in fact a very dangerous maneuver."

DEER CROSS HERE Safety officials urge drivers to drive more slowly after passing yellow "Deer Crossing" signs, posted in areas where big game animals are commonly found in or near the road.

hitting a live animal on the road or a downed animal struck by another vehicle.

If you see a deer or elk on the road, slow down or stop to let the animal continue crossing. Do not swerve while driving at high speeds to avoid either a live animal or roadkill. Irwin says trying to avoid hitting deer or other animals on a road often causes the vehicle to roll over. "Though it seems intuitive, swerving is in fact a very dangerous maneuver. It can put you in the ditch or worse," Irwin says.

So what do you do if you can't brake in time to avoid a collision? "The safest thing is actually to drive into the animal," says Irwin.

If you hit a deer or elk, pull off to the shoulder with your hazard lights on. Check that no one in the vehicle is seriously hurt. If it can be done safely, remove the dead animal to the roadside to prevent it from becoming a hazard to other vehicles. "If it's lifeless, and you are sure you won't get hit by approaching vehicles, you can quickly drag it off the road," Irwin says. "But if the animal is still alive and moving, or traffic is busy, that's not a safe option."

Next, call 911 and report the collision to the Montana Highway Patrol.

Jess Field grew up near Dupuyer and is now a newspaper reporter in Alaska.

If the animal is still on the road, figure out a safe way to warn approaching motorists. "Putting out flares along the roadside will get people to at least slow down so they can see the carcass ahead of them," Irwin says.

Holland warns against trying to kill the animal if it is wounded. "Never discharge a firearm on or near a public roadway. It's too dangerous, and it's also illegal," he says. Instead, call the authorities and see if a game warden, sheriff, or other peace officer can drive out and safely dispatch the animal.

CHECK FOR SPOILAGE

If you decide to salvage a big game animal hit by you or someone else (the law also allows people to pick up dead deer, elk, moose, or pronghorn they did not hit), treat the carcass as you would any downed animal. The meat of a newly killed animal is likely in good shape. But if you come upon a carcass hit by someone else, you'll definitely want to check for open wounds, sores, and signs of spoilage or scavenging.

In either case, consider the temperature and how long it will take to transport the animal to a processor or home. One of the biggest challenges of salvaging a roadkill is that you must remove it whole. Field-dressing along the roadside or even in the barrow pit is strongly discouraged, says Holland. "No one wants to see gut piles along the side of the road," he says. "And gut piles attract scavengers or predators like eagles and coyotes, creating additional traffic hazards."

That means you must transport the animal somewhere you can field-dress it and dispose of the gut pile responsibly.

Once you remove the carcass from the road, you have 24 hours to apply for, in person or online, and obtain a salvage permit, available at no cost. Game wardens or highway patrol officers called to the accident scene can issue one. Or, once home, you can complete the online application and print it out. Processing facilities will not accept a carcass if you don't have the *printed* permit (showing them the permit on the screen of a cell phone or other mobile device doesn't qualify).

I hit that doe in late fall. The deer was not too damaged (only some broken ribs) and the temperature was perfect for transport. Even so, the thought of eating roadkill was not easy to wrap my mind around, at first. But once the processor turned the carcass into several dozen packages of tasty venison, I put any misgivings behind me. If I ever have the misfortune of hitting another deer—or elk, moose, or pronghorn (or finding one recently killed by another vehicle)—I'm fully prepared to once again make the best of the situation and not let that meat go to waste.

To apply for a Vehicle-Killed Wildlife Salvage Permit, visit fwp.mt.gov/hunting/licenses/salvagePermit.html.

GOOD START In 2014, the first year of the new Vehicle-Killed Wildlife Salvage Permit, 1,100 animals were salvaged statewide and processed into venison steaks, burger, roasts, and chops. Last year the number increased to 1,269.

LEFT TO RIGHT: HALLIE RUGHEIMER; DAWN Y. WILSON; DONALD M. JONES; PAUL N. QUENEAU

Kids on Ice

FWP's "hard-water" clinics get kids outdoors and teach them to catch fish and understand underwater biology.

By Amber Steed

On a sunny Tuesday morning in mid-February, the crunch of snow under shuffling feet mixes with the boisterous chatter of students standing on frozen Echo Lake, three miles northeast of Bigfork. The air is charged with excitement. "Are you ready?" shouts instructor Clay Anderson, a Flathead Lake fishing charter captain and fishing clinic volunteer. "Yeah!" the kids yell back. "Are you *ready*?" Anderson shouts back, louder. "*Yeah*!" the students cry. And with that, he fires up his ice auger and begins drilling holes so the fun can begin.

Each winter Montana Fish, Wildlife & Parks organizes more than 200 ice fishing events during January and February as part of its Hooked on Fishing Program. Across Montana, students in upper elementary and middle school classes venture out onto local waters—like Kremlin Town Pond, Bynum Reservoir northwest of Choteau, and Home Run Pond in Glasgow—to learn about fish and fishing while connecting with their local environment. Program officials hope the outings spark a passion for fishing and other outdoor recreation. "Through Hooked on Fishing, we help kids become lifelong outdoor enthusiasts in every season," says Marc Kloker, Regional FWP Information and Education Program manager in Glasgow. "The ice fishing clinics are a great way to get kids excited about fishing and their local environment in the middle of winter. Plus, it lets them get out of the house, run around, and have a blast. It's also a reward for all the work they do on fish and aquatic resources in class throughout the year."

It can be cold and potentially hazardous, but ice fishing (also known as "hard-water" fishing) has some advantages over fishing open ("soft") water when it comes to teaching kids. One is simply the ease of moving around out on the ice. "Engaging with kids is much easier when they're hard-water fishing," says Dave Hagengruber, FWP Angler Education Program coordinator. During open-water clinics, kids spread out along the banks of ponds, requiring instructors to race up and down to untangle lines and remove fish from hooks. On ice, kids and teachers are closer to each other and can interact more easily. It's also easier for kids to see who is catching fish and then learn what techniques their friends are using.

Another major benefit of hard-water fishing: Fish are often easier to catch. Anglers casting from shore cover much less water than those on ice, who can move about freely. "If we drill a hole and it's not performing, we simply drill more until we find fish that are biting," Hagengruber says. In addition, fish finders and underwater cameras give students new perspectives on an otherwise dark and mysterious world beneath the ice surface.

Because of the inherent dangers of being on the ice, FWP's winter fishing clinics make safety the top priority. "Before we set foot on the ice, the kids know how to tell if it's safe to go out," says Hagengruber. Instructors teach the students never to walk on ice near open water, which is usually too thin to support a person. Kids should also look for adults, or fresh tracks of adults, already on

> "I encourage the kids to have fun and be loud, because the fish will bite either way."

Amber Steed is the FWP fisheries biologist in Kalispell.

HOOKED Left: Showing off a rainbow trout at an FWP ice fishing event at Pine Grove Pond near Kalispell. Below: An instructor asks young anglers a question at East Fork Reservoir near Lewistown.

the ice as indications of safe conditions. "Since the kids can't test ice thickness themselves, they have to rely on adults to make the right decision," says Hagengruber. "If few to no other people are on the ice, you shouldn't be either." Ice safety experts say that ice should be at least four inches thick before anyone walks on it.

Once they know the ice is safe, fishing instructors make the clinics as fun as possible. "I try not to make it competitive, because fishing is something kids can do where they don't need to compete," says Hagengruber. "In fact, if a few kids are catching a lot of fish, we'll often ask them to share their skill and technique and help classmates who aren't catching any."

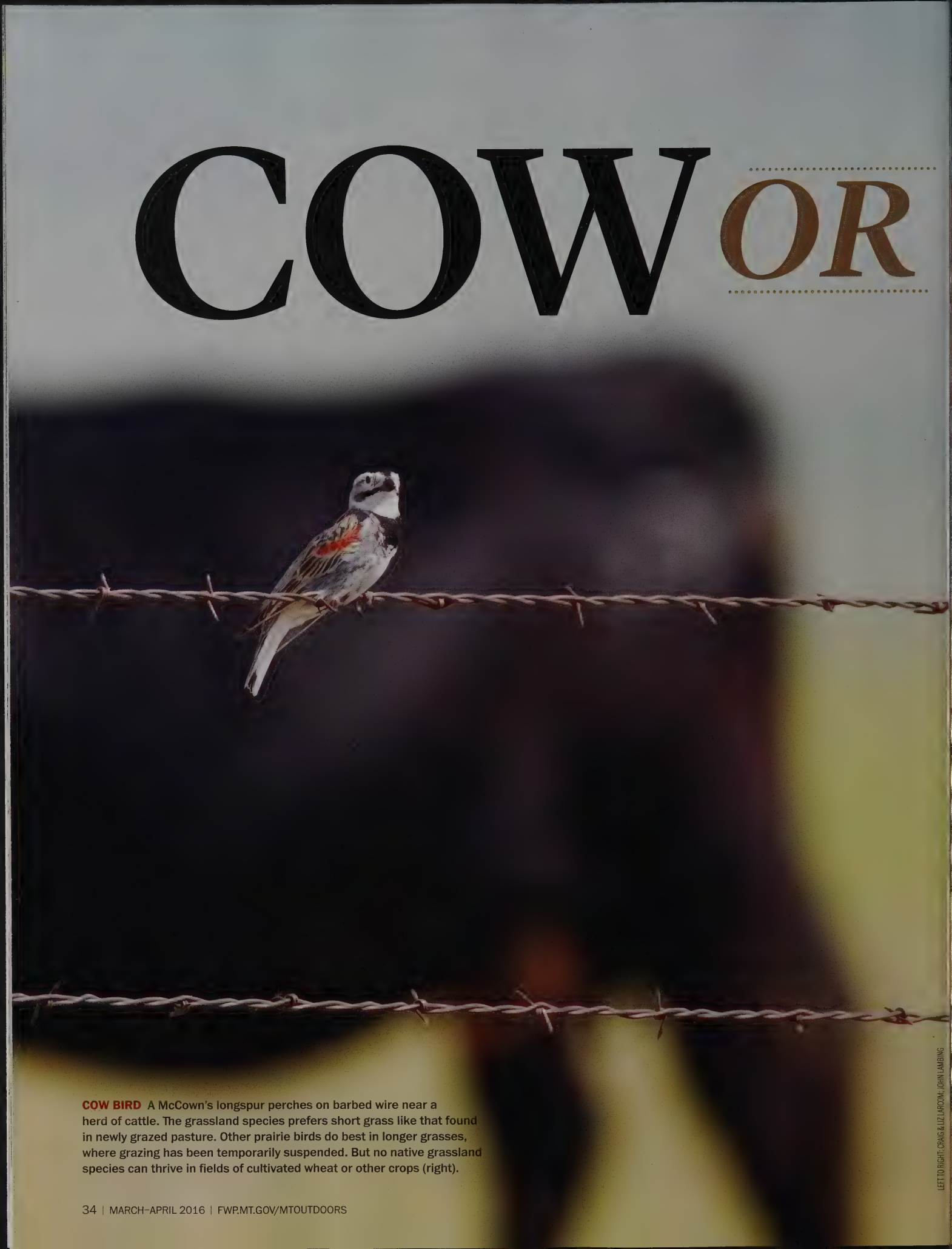
Kloker admits it's not a conventional approach, but he and many instructors actually encourage the students to kiss their catch as a way of connecting with the fish. "It takes surprisingly little encouragement to get a kids to kiss a fish," he says.

After they catch (and smooch) a fish, students usually release their catch. Sometimes they also have the option of taking the fish home to eat or to the classroom for dissection. With dissection, the students can tie their outdoor experience to an entire lesson about the biology of their fish and its habitat, broadening their connection with and understanding of the local environment.

Back on Echo Lake, the sun is out and the perch bite is on. Despite the cold, days like these motivate Anderson to continue volunteering. "I encourage the kids to have fun and be loud, because the fish will bite either way," he says. "And then, when they reel in that first fish, I know they're hooked."

LEFT TO RIGHT: JOHN FRALEY/FWP; DAVE RUMMANS; SHUTTERSTOCK

COW OR



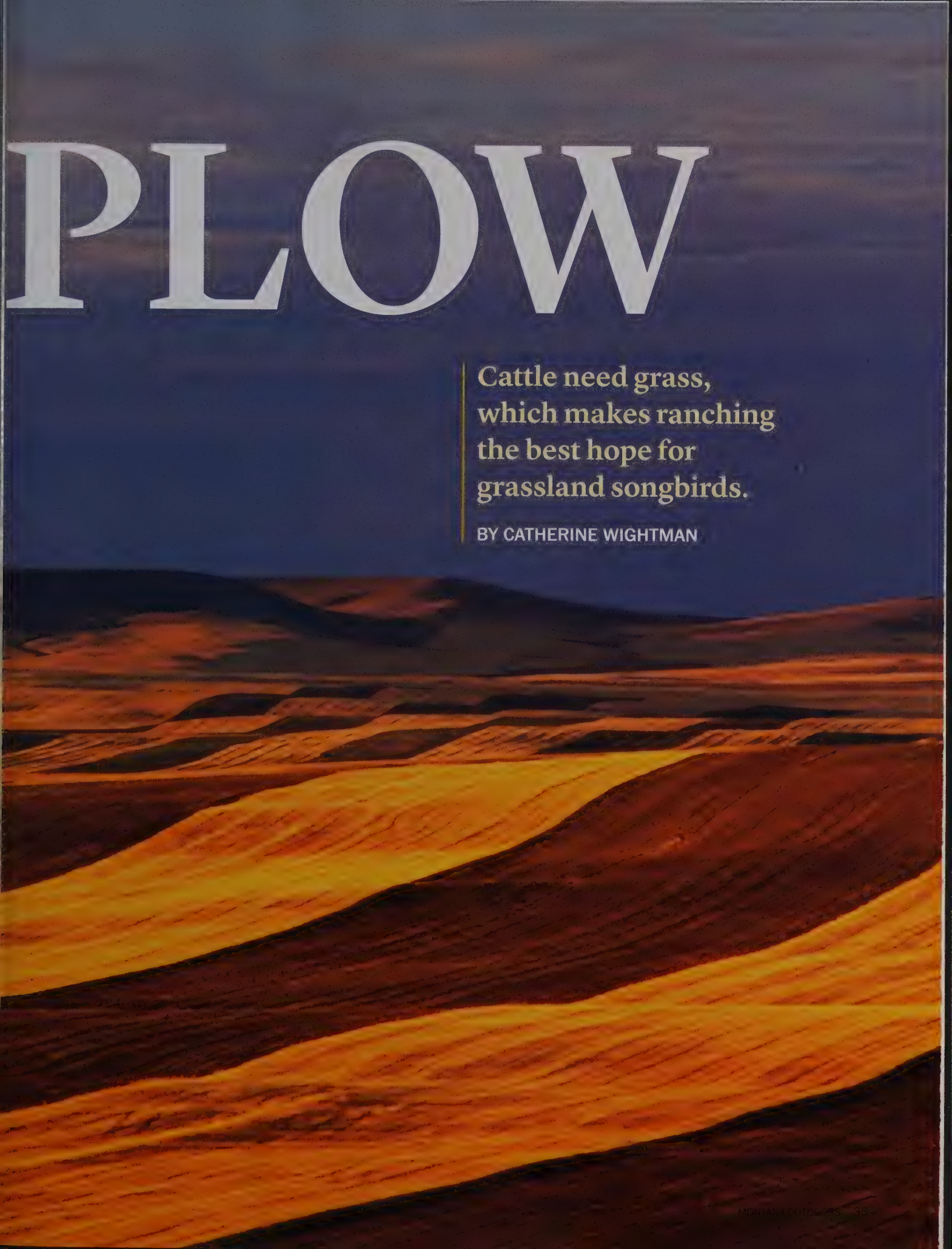
COW BIRD A McCown's longspur perches on barbed wire near a herd of cattle. The grassland species prefers short grass like that found in newly grazed pasture. Other prairie birds do best in longer grasses, where grazing has been temporarily suspended. But no native grassland species can thrive in fields of cultivated wheat or other crops (right).

LEFT TO RIGHT: CRAIG & LIZ LARCOM; JOHN LAMBING

PLOW

Cattle need grass, which makes ranching the best hope for grassland songbirds.

BY CATHERINE WIGHTMAN



When John Carlson thinks of eastern Montana in spring, he hears music. "To me, the real beauty of prairie is the complex chorus of grassland bird song," says Carlson, an avid birder who grew up in Fort Peck and for the past 12 years has been a conservation biologist for the Bureau of Land Management (BLM) in Billings. "McCown's longspurs fly up high in the air, pull their wings back, spread their tails, and emit a tinkling jumble of notes while parachuting to the ground in a lazy circle," he says. Sprague's pipits are the soloists of this early morning performance. "High in the sky, barely visible to the human eye, the pipit circles and emits a song described by one early naturalist as 'ethereal, ringing bells that descend from the heavens,'" Carlson says. "Pipits are known to remain in the clouds, singing their high, thin notes for over an hour at a time."

The pipit song in particular resonated with 19th-century naturalists who explored the northern Great Plains. Their old journals contain glowing references to the melodic song of the Missouri skylark, as the pipit was called then. The species was described as "common and abundant," and the pipit's song rang out across thousands of miles of prairie. No more, however. Today, prairie visitors hear the bird's heavenly chorus in only a few places that retain large tracts of native northern prairie. Montana's Hi-Line is one such place.

Yet even in this remote northern landscape, largely unchanged over the past century, scientists wonder if the pipit's song, and those of other grassland birds, will continue to ring out much longer.

Worrisome decline

Nationwide, grassland songbirds are disappearing. According to the North American Breeding Bird Survey, the continent's longest-running bird monitoring program, chestnut-collared longspur numbers have tumbled by 81 percent since the survey began keeping records in 1966. It also shows an 80 percent decline in Baird's sparrow populations over that same period. Even grassland species that were common not too long ago, like western meadowlarks, show slight downward population trends. Sprague's pipits are holding steady in the United States, yet numbers have decreased by 83 percent over the past half century in prairie Canada. That downward trend so concerns the U.S. Fish and Wildlife Service that the agency is considering listing the species as federally threatened or endangered.

What accounts for this troubling drop in grassland bird numbers? Mostly, say scientists, it's the conversion of grassland into cropland.

According to Montana Natural Heritage Program estimates, one-third of the native grassland in eastern Montana has been plowed up or otherwise significantly altered since the mid-1800s. The decline is even greater outside Montana's borders. Scientists estimate that 70 percent of all grasslands in the northern Great Plains has been lost since European settlement.

What has saved prairie birds along the Hi-Line is cattle. Ranchers manage their land to sustain grass production, which benefits bovines and birds. "The reason we have these strongholds of native birds and other prairie wildlife is that the long history of ranching along the Hi-Line has preserved grasslands," says Rick Northrup, chief of the Montana Fish, Wildlife & Parks Wildlife Habitat Bureau. For more than a century, cattle ranching has remained profitable enough that most Hi-Line ranchers aren't tempted to convert their grassland to wheat. But a growing global demand for grain, along with technological advances in seeds, is making farming more profitable. In addition, federal Farm Bill policies have generally favored farming over ranching.

Northrup notes that most productive farmable land along the Hi-Line has long since been turned over. "What remains is soil that is highly erodible and of low productivity," he says. "These remaining native grasslands need to remain intact to support livestock and native wildlife."

Keep ranching profitable

Wheat is an essential crop for Montana's rural economy. Unfortunately, grassland birds have trouble nesting successfully in wheat. Grain fields lack the vegetation structure and insect production that native prairie provides. Because approximately 85 percent of remaining grasslands in the northern Great Plains are privately owned, "the only way grassland bird populations can remain viable is if ranching remains profitable enough to keep the land in grass," says Northrup.

Once described as "common and abundant," the Sprague's pipit's song rang out across thousands of miles of prairie. No more, however.

FWP is working with the Natural Resources Conservation Service, U.S. Fish and Wildlife Service, and other conservation

Catherine Wightman is an FWP wildlife habitat biologist in Helena.

TOP TO BOTTOM: JOHN LAMBING; JOHN CARLSON

DENVER BRYAN

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SPECTRUM OF SPECIES Different grassland wildlife species evolved to live in the widely different vegetative conditions found in native prairie (above). McCown's longspurs and mountain plovers nest in sparse plant cover. Baird's sparrows need thick vegetation for nesting and will abandon areas grazed too intensely. When grasslands are converted to agriculture, populations of species like the Sprague's pipit (below) tumble, as shown by the pipit's 83 percent population decline in prairie Canada.

PRAIRIE SONGSTERS Abundant and diverse native vegetation is the key to saving melodic grassland species such as (clockwise from top left) the Baird's sparrow, horned lark, chestnut-collared longspur, and savannah sparrow. USFWS private lands biologist Marisa Lipsey of Glasgow (below right, searching for birds at sunrise) recently completed her doctoral thesis at the University of Montana on the grassland requirements of native species. She found that natural variation in the prairie landscape and spring rainfall take care of much of the diversity needed for grassland birds.

partners to help ranchers maintain long-term grassland stewardship. Agencies provide technical assistance like developing grazing strategies; share in the cost of fencing, watering systems, and other rangeland infrastructure; or purchase conservation easements that protect grasslands from the plow. "The goal is to help keep ranching economically viable so ranchers don't feel the pressure to convert grassland to crops or sell or lease it for conversion," says Northrup. "That also preserves an important way of life that has contributed to Montana's economy and culture for more than a century."

Historically, Montana's mixed-grass prairie was a mosaic of various grass heights and densities. Periodic wildfires and the constant movement of grazing bison created a patchwork of short, medium, and tall grasses. Bird species have adapted to take advantage of this vegetative diversity. Sprague's pipits and Baird's sparrows nest among tall, abundant grasses—seas of green that gently ripple in the prairie wind. Longspurs, on the other hand, nest in shorter grasses, like a swath of freshly clipped grass in the wake of a large herd of cattle. These and other grassland birds often occupy the same landscape but in slightly different local niches.

Birds need grass, diversity

Marisa Lipsey recently completed a study at the University of Montana on the grassland requirements of various bird species in Phillips and Valley Counties. She tracked the grassland components that different species key in on when they return in the spring and select breeding locations. "I think they are searching the landscape for places without trees, places where they can see the horizon," Lipsey says. At that large scale, cropland intermixed with native grassland meets the birds' criteria for openness. The problem could come when the birds fly down into these areas and can't find suitable nesting conditions on the cropland. "One of the reasons for the population declines may be that birds are attracted to open areas, but that can be problematic if there isn't adequate habitat there for breeding," she says.

Lipsey also found that how cattle are grazed from one ranch or public allotment to the next matters less than simply whether a landscape contains abundant grass. "At least in high-moisture years like those during our study, grazing by itself has little effect on bird abundance," says Lipsey, now a private lands

CLOCKWISE FROM TOP LEFT: BOB MARTINKA; DONALD M. JONES; MASLOWSKI WILDLIFE PRODUCTIONS; ELIZABETH E. MOORE

biologist for the U.S. Fish and Wildlife Service in Glasgow. "What really drives grassland bird populations is soil type—which influences the type of grasses that grow—and weather, particularly moisture levels."

Lipsey explains that in wetter years or locations, dense-grass bird species are more abundant, and in drier years or locations, sparse-grass species are more numerous. The natural variation in the landscape and in spring rainfall take care of much of the diversity needed for grassland birds.

That's not to say managed grazing—such as systems that temporarily rest some pastures while intensively grazing others—can't benefit grassland birds. "On a large landscape scale, you definitely need the heterogeneous cover that comes from managed grazing," Lipsey says.

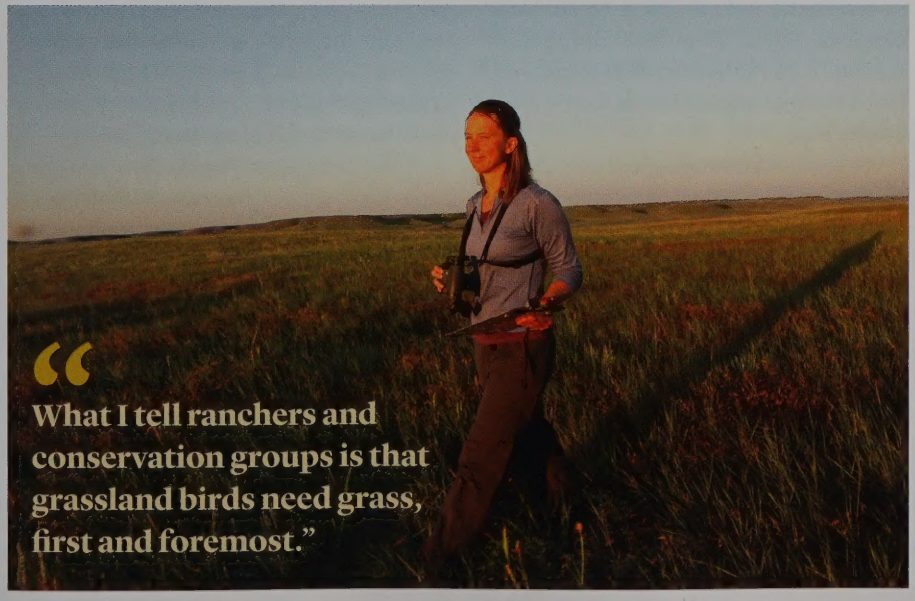
When talking to Hi-Line ranchers and conservation groups, adds Lipsey, the main point she drives home is that "grassland birds need grass, first and foremost."

Grazing regimes still important

The BLM, which owns millions of acres along the Hi-Line, helps preserve grassland health by requiring leasees to use managed grazing systems. "That can be something like varying the timing, duration, or intensity of the grazing to achieve good rangeland health for the lands we manage," says Carlson, the BLM biologist. "The most important thing is that it's *managed* grazing." The BLM factors in grassland birds, as well as other wildlife species, cattle production, and overall watershed health when adjusting the terms and conditions of grazing leases. "I think the management programs we have in place, along with managed grazing on private land, are the main reasons there's still so much intact prairie along the Hi-Line, and why many grassland birds are doing well there," Carlson says.

While agreeing with Lipsey's conclusion that rainfall and soil type are more important than grazing methods for creating grassland diversity, Carlson notes that managed grazing does much for prairie birds. "During a drought, for instance, grazing systems that rest some areas allow grasses to grow taller and denser than they would with unmanaged grazing," he says.

So far, Montana has been able to retain more acres of high-quality, mixed-grass prairie than any other state. That habitat supports populations of swift fox, mule deer, pronghorn, and, especially, birds. But there's no guarantee those grasslands will remain as they have for the past 10,000 years. As worldwide demand for grain continues to grow, so does pressure to plow (see sidebar at right). "Think of the Hi-Line as a big island of intact, native prairie," Carlson says. "We need to stay vigilant to keep the island big, by making sure the shores don't erode."



"What I tell ranchers and conservation groups is that grassland birds need grass, first and foremost."

LEFT TO RIGHT: AMI VITALE; SHUTTERSTOCK

Why plow—and why now?

Global grains prices are one of the biggest drivers behind the conversion of prairie to cropland. In Montana, the price of wheat can determine whether many ranchers continue to run cattle or turn their grasslands into grain fields.

Wheat prices skyrocketed from $2.57 per bushel in 2000 to $7.60 in 2012, due mainly to droughts and restrictions in other wheat-producing countries like Australia and Russia. According to one study, 17 Montana counties, most along the Hi-Line, each converted an average of 30,000 acres of grassland to wheat in the three years of 2008 to 2011.

To the east, where corn is king, researchers from South Dakota State University found that 1.3 million acres of grassland disappeared between 2006 and 2011 in North Dakota, South Dakota, Nebraska, Iowa, and Minnesota as ranchers in those states cashed in on rising corn prices. "This is kind of the worst-kept secret in the Northern Plains," lead author of the SDSU study, Christopher Wright, told reporters.

The study found that rates of grassland conversion equaled deforestation rates in Brazil's Amazon Bain. "Historically, comparable grassland conversion rates have not been seen...since the 1920s and 1930s, the era of rapid mechanization of U.S. agriculture," the study notes.

Grain prices fluctuate widely and constantly. But once a prairie is tilled, it never regains its full biological diversity. Hundreds of square miles of northern Great Plains have been plowed under during the past decade.

As this issue goes to press, wheat has dropped to $5.26 a bushel following recent increases in Australian production and a downturn in the Chinese economy. Though hard on Montana wheat producers, that could give remaining prairie a temporary reprieve. Even so, birds will continue to arrive at the Hi-Line each spring in search of grasslands and encounter vast landscapes of cropland no longer suitable for nesting or raising their young.

—Editor

SHUTTERSTOCK

The first insects of spring

by Bruce Auchly

Believe it or not, winter will end someday. And when that day arrives, the first harbinger of spring will likely be an insect.

Before bears emerge from their dens, songbirds return to find a nest site, and flowers bloom, an insect will stir and begin to crawl or fly.

Insects have different ways of coping with winter. Bees eat their stored honey, shiver, and move about in a tight ball, raising the temperature in the hive. Some insects dig below the frost line. Others survive by changing the way their body functions. Many simply go dormant.

The mourning cloak butterfly is an early season emerger. This beautiful butterfly, which became Montana's state insect in 2001, derives its name from the dark brown mourning cloaks once worn to funerals.

In late winter or early spring—about now—the adult mourning cloak awakens from a dormant state in its winter hiding spot, usually under a bit of tree bark.

The mourning cloak is one of very few butterfly species that survive winter in the adult stage. Because their wings are dark brown, they absorb heat energy from the sun and fly on warm late-winter days.

Mating takes place in spring, after which the female produces a mass of eggs that metamorphosize to caterpillar to chrysalis (also called pupa) to butterfly by late June to early July. That leaves enough time for an adult moarning cloak to feed and prepare for winter.

Perhaps the most fascinating insects are those that change the way their body functions.

Bruce Auchly manages the FWP Regional Information and Education Program in Great Falls.

An insect is basically a small, cold-blooded, liquid-filled box. Because its skeleton is on the outside of its body, an insect's internal organs float in a fluid that's mostly water.

To avoid becoming an ice cube, insects have evolved a variety of winter survival methods. Some isolate water inside their body into small drops; the smaller the drop, the lower the freezing point.

Also, chemicals in some insects act like antifreeze, lowering the freezing point or preventing further freezing once ice crystals form.

Then there are aquatic insects, which remain active in streams that stay open. Stoneflies mate and lay eggs in winter. Caddis flies and crane flies mate on warm winter days. Ask any Missouri River fly angler about midges hatching on a mild February afternoon that has a mix of sun and clouds.

Still other insect populations leave a single member to start anew. Bumblebees provide an example. A single previously fertilized queen bumblebee emerges from dormancy to start a new colony, which lasts only through summer but produces several potential queens to overwinter and start new colonies.

Whatever method insects use to overwinter, they have evolved to survive and signal that warmer days are ahead.

ILLUSTRATION BY C.B. JENNE

Marbled godwit

Limosa fedoa

By Dennis C. Joyes

I was standing at the edge of a muddy slough, trying to replace a broken fence post, when a large, cinnamon-colored shorebird sailed low overhead. After a shrill *whit whit ker-whit*, it decided I posed no threat and went back to feeding along the water's edge. My visitor was a marbled godwit, a wading bird and a true prairie native, as much at home with grazing cattle as its ancestors were among herds of bison.

NICK FUCCI

Scientific name

Limosa, Latin for "muddy," refers to the wet areas where the birds feed; ***fedoa*** is an outdated English name for godwit. (The name godwit originates in Old English, with god meaning "good," and wit coming from *wihte*, meaning "creature.")

Appearance

The marbled godwit is one of Montana's largest shorebirds, 16 to 20 inches long. Only the long-billed curlew is larger. From a distance the marbled godwit appears uniformly buff-brown. A closer look shows the upper parts are speckled, or "marbled," perfect camouflage for a bird that nests on prairie uplands. In flight, the wing underparts flash a bright cinnamon, while the bill has two colors, the forward half black and the base orange. Females are somewhat larger than males, but otherwise the sexes are indistinguishable.

You can easily tell a godwit from a curlew by the bill. The godwit's is long and curves up slightly. The curlew's is extremely long and curves down slightly (a memory aid is to think: *curl-low*).

Sounds

Godwits have several distinctive and not easily forgotten calls. The sharp *whit whit ker-whit ker-whit* is usually heard in flight. A rapid-fire *ratica ratica ratica* is most often heard during spring courtship. The bird's distress call sounds something like a harsh *cor-ack*.

Range

Except for small, isolated populations on the Alaska peninsula and the James Bay portion of Hudson's Bay, marbled godwits breed only in the northern Great Plains—the Canadian prairies, the Dakotas into western Minnesota, and the glaciated plains of northern Montana. The big birds winter along the coast of California and western Mexico and, less commonly, around the Gulf of Mexico and the Florida coast. Scientists have yet to discover the migration routes or wintering locations of specific Montana populations.

Habitat

Godwits avoid cultivated fields and tall, dense vegetation. They are also ill adapted to non-native grasslands like CRP fields. Instead they prefer large blocks of moderately grazed native prairie with a variety of sparsely vegetated seasonal ponds and alkali wetlands. They maintain large territories, often more than 200 acres, and are most common in areas with a square mile or more of wetlands and prairie uplands.

Food

Godwits feed on mudflats and in shallow to moderately deep water. They probe for pondweed tubers, aquatic insects, leeches, and small fish, often entirely submerging their heads. They also spend time in grassy uplands, where they feed on grasshoppers, spiders, beetles, flies, and crickets.

Reproduction

The male selects a nest site in short prairie vegetation up to a quarter mile from water. The nest is a grass-lined depression in which the female lays four eggs, usually during mid- to late May. The spotted, buff- or olive-colored eggs hatch in 23 to 24 days. Like all shorebirds, godwit chicks can fend for themselves almost immediately. Under the watchful eye of their parents, they leave the nest within the first or second day. While nesting, godwits are all but invisible and will allow themselves to be nearly stepped on before flushing. They also feign injury to lead predators away from their nest and young. Although both parents share in incubating the eggs, they migrate and winter separately, reuniting again the following spring. Godwits are long lived and have been known to return to the same nesting area for 25 consecutive years.

Conservation

The fate of marbled godwits depends on the fate of native prairie. Conversion of prairie to cropland and drainage of prairie wetlands eliminates habitat and may further reduce populations by forcing birds to nest in unfavorable areas. Collisions with power lines have also been reported, especially where lines are constructed near wetlands.

Writer Dennis C. Joyes lives in Ontario and frequently visits his home state of Montana.

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PARTING SHOT

PERCH PUCKER An elementary student gives his first perch a kiss on the Helena Valley Regulating Reservoir this past winter during an FWP Hooked on Fishing ice fishing clinic. See story on page 32. Photo by Thom Bridge/*Independent Record*.

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